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CHEMICAL AGE

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PETROLEUM PROBLEMS

IN THEIR analysis of the effect of a free trade area on the UK chemical industry, the Economist Intelligence Unit suggested that since this country had made such progress in its petrochemical industry, it might improve its competitive position still further if it became more reliant on petroleum and less reliant on coal—sentiments with which we are not wholly in agreement.

The US is the country which has greatest working knowledge of petroleum and petrochemicals, and it is now apparent that that country has problems which seem likely to have an increasing effect upon US petrochemicals and possibly also on the US chemical industry.

Petrochemicals producers are concerned with meeting growing needs for raw materials and with governmental restrictions and interference in their operations. Recently the percentage of dry wells drilled in the US has increased from 23 per cent in 1937-41 to 38 per cent in the past five years. At the same time there has been a decline in the average amount of reserves developed per completed well. Also, costs of exploring for oil have increased, labour and equipment costs more, development of oil areas further afield and even off shore presents added difficulties, and finally there are declining profit margins.

These problems can affect the efficiency of the expanding US petrochemical industry, which is expected to have contributed 55 per cent of the 1957 output value of all chemicals and allied products.

US mid-continent petrochemical producers have been looking to Canada's reserves of natural gas as a future source of supply, but it seems that Canada has been having second thoughts about the desirability of tapping its trans-Canada pipeline near Winnipeg, Manitoba, in order to supply the US Middle West with gas. Mr. Diefenbaker, Prime Minister of Canada, has recently appointed a commission to study the matter of gas exports to the US.

Such has been the concern recently about oil supplies that the US Government has recently given permission for licences for development of its shale lands. Also, the US Bureau of Mines at Rifle, Colorado, has developed a process to make oil from shale. A pilot plant based on this process and operated in Brazil by Petrobras is described as a technological success. A prototype plant is to be erected by Petrobras with the assistance of technical US consultants.

It is of interest to note what steps some of the major US chemical producers are taking.

Union Carbide Corporation, for instance, have previously bought natural gas, or set up plants adjacent to refineries and bought the latters' off-gas. But natural gas prices are increasing and refiners themselves are showing greater eagerness for petrochemical production, so supplies of by-product gases will become increasingly difficult to obtain. Carbide therefore plan to use crude oil instead of natural gas as a raw material at their West Virginia plant which is to produce ethylene oxide, ethanol, isopropanol and other chemicals. Use of crude oil would also provide a larger supply of aromatics for the company. It is even believed that Carbide might consider coal hydrogenation—a project which the company were working on in 1952. In

releasing news of its pilot plant results, Carbide indicated that they would use the benzene, naphthalene, phenol and certain other aromatics produced captively.

Two US companies who have wanted to ensure certain of their sources of by-products are Monsanto and Dow Chemicals. Monsanto have acquired Lion Oil and Dow Bay Refining. Dow's ethylene for their Ziegler polythene plant is, in fact, obtained from Bay Refining. In the 40's this company also devised a scheme to crack crude oil to produce aliphatics and aromatics. However, as Dow did not require these products at the time, the project was not developed.

News from Germany shows that methods utilising crude oils for direct production of ethylene and propylene are being investigated. A pyrolysis on a moving bed of hot coke is being studied by Hoechst. Because of the low hydrogen-to-carbon ratio of the starting material, however, large quantities of coke will be produced if olefins are the main product. But the production of aliphatics and aromatics would reduce the coke production. Indeed, it is clear that carbide could be an important raw material in aromatics manufacture, particularly on the Continent. In the UK the larger chemical concerns have developed petroleum cracking plants. Thus ICI have two cracking units in operation at Wilton. At Grangemouth, British Hydrocarbon Chemicals' second petroleum cracking plant came into operation early last year, while ICI and Shell Chemicals each have an oil gasification plant for ammonia production.

EUROPE'S PETROCHEMICAL INDUSTRY

REFERENCE was made in the chemicals section of the Economist Intelligence Unit's recent report, 'Britain and Europe,' on the importance of petroleum (see CHEMICAL AGE, 14 December, page 967). In continental Europe output of petrochemicals has risen from just over 10,000 tons in 1946 to over a million tons in 1956. In the last decade and particularly in the last few years, refinery capacity has increased greatly, thus making more by-product gases available and heavier fractions for cracking. Also, in Italy and France, the new discoveries of large deposits of natural gas have formed the basis for petrochemical industries in these two countries. In the EIU report it was also noted that in many instances UK companies had an interest in refineries and petrochemical projects set up on the Continent. Thus in France Naphtachimie, near Marseilles, is owned mainly by British Petroleum and Péchiney. Expansion plans have recently been announced by which Naphtachimie's output of ethylene and propylene will be increased. And uses for these petrochemicals will include polythene and ethylene oxide.

A plant, 60 per cent owned by Shell, is that of Shell-Saint Gobain, near Marseilles. It is expanding plant to produce detergent alkylate, Epikote resins and C_4 solvents. The same company will also produce Teepol at another plant near Rouen.

In the Netherlands, the Shell Pervis refinery produces Teepol, Epikote resins, p.v.c. solvents and insecticides, aldrin and dieldrin. A synthetic glycerol plant is due on stream this year (1958), while a company which is two-thirds owned by Shell-Mekog, makes nitrogen fertilisers partly from petroleum raw materials.

Shell and BASF have formed Rheinische Olefin Werke and British Petroleum and Bayer have set up Erdoelchemie in Germany. Both these plants are near Cologne and are very large. Rheinische Olefin is already in production with polythene.

When all the proposed new plants in Europe are completed there will be six in Germany, five in France, five in Italy, one in the Netherlands and one in Spain. Last year polythene production in Europe totalled 80,000 tons, but consumption is expected to triple in the next five years.

US companies are also active in Europe. For instance, near Rouen, Esso's Port-Jérome refinery has a new steam cracker which is to produce 36,000 tons of ethylene and 8,000 tons of butadiene, as well as other chemical materials.

Union Carbide, Monsanto, Dow, Oronite and Atlantic Refining are US companies having plants in Europe or are participating in European petrochemical projects. US estimates suggest that investment in petrochemicals in Europe which in 1956 totalled $500 million will reach $1.25 billion by 1959.

UPGRADING COKE OVEN AMMONIA

THE problem of what to do with by-product low concentration ammonia liquor from coke oven operations, used to produce low analysis ammonium sulphate which now faces stiff competition from high-analysis fertilisers, has brought several answers for US manufacturers. Several companies have been switching to ammonium phosphate, but the most interesting suggestion is from a Chicago chemist and inventor, Paul Caldwell.

The process proposed by Caldwell is to strip the liquor with warm air, oxidise the stripper overhead to nitrogen oxides and so produce nitric acid. This acid would then be used plus phosphate rock, potash and additional ammonia (no sulphuric or phosphoric acid) to make a high analysis (13-13-13) nitrophosphate fertiliser free of fluorine. Fluorine would be readily recovered as potassium silicofluoride at an economic cost to compete with sodium silicofluoride in the US aluminium and vitreous enamel markets.

In the fertiliser process suggested by Caldwell, now the subject of US patent No. 2,778,712, phosphate rock is treated with straight nitric acid. The resulting product is clarified by filtration, and then treated with potassium chloride to precipitate potassium silicofluoride which is filtered off. Details of the next step which involves removal of part of the calcium present are not given, as this is the subject of another patent which is not yet issued.

In the final stage, the nitrophosphate liquor is ammoniated, fortified with more potash and crystallised as a non-hygroscopic product.

The process would only prove economic if there was plenty of by-product ammonia liquor available, and the fertiliser plant would have to produce 100,000 tons a year of mixed products to be economical.

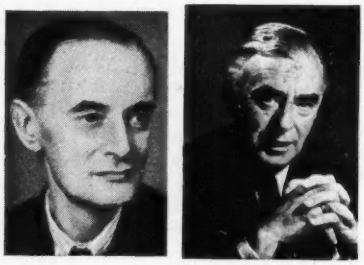
Another interesting point reported by Caldwell is that a steel mill now doubling its coking capacity is planning to dispose of its increased ammonia to the atmosphere by dumping it on the slag pile in order to thermally dissociate it into hydrogen and nitrogen.

In the UK there have been indications, however, that ammonia liquor is being used by farmers as a liquid nitrogenous fertiliser. If this trend continues to develop, the UK coke producers should not find any difficulty in getting rid of ammonia liquor.

NEW YEAR HONOURS FEATURE CHEMISTRY, RESEARCH, ATOMICS

AMONG those knighted in the New Year's Honours List are PROFESSOR CHRISTOPHER KELK INGOLD and MR. WALTER JOHN WORBOYS. Professor Ingold is Professor of Chemistry at the University of London, University College, and director of the chemistry laboratories. He was educated at University College, Southampton and the Imperial College of Science and Technology, London, and was awarded the Meldola Medal for 1922–23.

After two years as research chemist with the Cassel Cyanide Co. (acquired by Imperial Chemical Industries in 1927) he was appointed lecturer in chemistry at Imperial College in 1920 and Professor of Organic Chemistry at Leeds in 1924, where he remained till 1930. Other appointments included visiting lecturer, Stanford University, US, 1932, Baker lecturer, Cornell University, US, 1950, and president of the Chemical Society, 1952–54.



Professor C. K. Ingold [left] and W. J. Worboys, created Knights Bachelor

His main interests are structural organic chemistry and reaction mechanisms.

Apart from being commercial director of Imperial Chemical Industries Ltd., W. J. Worboys is vice-president and immediate past-president of the Association of British Chemical Manufacturers and chairman of the Council of Industrial Design.

Born in Australia in 1900 he was educated at the Scotch College, Western Australia and the University of Western Australia. He was awarded his Ph.D. at Lincoln College, Oxford. Since 1925 he has held various posts with ICI. He became director of the Billingham division in 1933, manager, southern sales region in 1939, joint managing director, Billingham division, 1941, and chairman of the plastics division 1942. In 1948 he became an ICI director.

Others knighted include MR. ARTHUR THOMAS BARNARD, C.B., O.B.E., director of inspection, Ministry of Supply, MR. WILLIAM RICHARD JOSEPH COOK, C.B., deputy director, Atomic Weapons Research Establishment, Aldermaston, PROFESSOR HANS ADOLF KREBS, Whitley Professor of Biochemistry at the University of Oxford, and DR. JULIAN HUXLEY, biologist and writer.

Professor Krebs was educated in Germany but has held many appointments in the UK, at Cambridge and Sheffield, before coming to Oxford. He was awarded the Nobel Prize for Medicine (jointly) in 1953. He became Whitley Professor and director of the Medical Council Research Unit in Cell Metabolism in 1854.

K. C. B.

A new Knight Commander of the Order of the Bath (K.C.B.) is DR. HARRY WORK MELVILLE, secretary of the Privy Council for Scientific and Industrial Research since 1956. Born in 1908 he was educated at George Heriot's School, Edinburgh, Edinburgh University and Cambridge University. He became assistant director of the Colloid Science Laboratory, Cambridge, in 1938, and was Professor of Chemistry at the University of Aberdeen from 1940 to 1948. During World War II he was scientific adviser to the chief superintendent of chemical defence, Ministry of Supply, and superintendent of the radar research station. From 1948 to 1956 he was Mason Professor of Chemistry at the University of Birmingham.

K. B. E.

Among the new Knight Commanders of the Order of the British Empire is MR. NEVILLE ARCHIBALD GASS, C.B.E., M.C., chairman of the British Petroleum Co. Ltd.

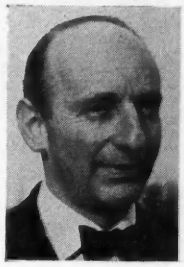
C. B. E.

The new Commanders of the Order of the British Empire (C.B.E.) include PROFESSOR HARRY JULIUS EMELEUS, Professor of Inorganic Chemistry at the University of Cambridge. He was educated at Hastings Grammar School and Imperial College, London, and was on the staff of Imperial College from 1931 to 1945.

Other C.B.E.s are MR. ERIC HAROLD BALL, managing director of The British Thomson-Houston Co., DR. CHRISTOPHER HOLLIS JOHNSON, director, materials and explosives development, Ministry of Supply, DR. GEORGE ADAM REAY, O.B.E., superintendent, the Torry Research Station, Food Investigation Organisation, Department of Scientific and Industrial Research, DR. RALPH WINTON WEST, principal, Battersea College of Technology, MR. JOHN WILSON, M.C., director of research, British Rayon Research Association, and MR. H. B. MCCANCE, council chairman, Linen Industry Research Association.

O. B. E.

Prominent among the new O.B.E.s is DR. HENRY SELIGMAN, deputy chief scientist and head of isotope division, Atomic Energy Research Establishment, Harwell. Educated at the University of Paris and in Switzerland, Dr. Seligman, who was born in 1909, was a member of the atomic energy project in Canada from 1943 to 1947, when he became head of the isotope division at Harwell. Recently (see last week's CHEMICAL AGE, p. 1056) he was offered an appointment as one of the four deputies to the general director of the International Atomic Energy Agency in Vienna.



For Dr. Henry Seligman, head of AEA isotope division, an O.B.E.

Other O.B.E.s include MR. STANLEY ALTY, works manager, brine and water works, alkali division, Imperial Chemical Industries; MR. REGINALD ARTANE MCMAHON, secretary, British Electrical and Allied Industries Research Association; MR. STANLEY HATHAWAY SMITH, finance and accounts officer, Department of Scientific and Industrial Research; DR. RICE WILLIAMS, B.E.M., senior soil chemist, National Agricultural Advisory Service; MR. G. F. BROWN, director, Cottage Laboratories Ltd., Cobham, Surrey; MR. W. J. CHALLENS, senior superintendant, weapons electronics, Atomic Weapons Research Establishment, Aldermaston; MR. R. A. F. HAMMOND, principal scientific officer, Ministry of Supply, Armament Research and Development Establishment; DR. C. D. LAWRENCE, superintending scientist, Central Dockyard Laboratory, Portsmouth; and MR. W. H. HILLIER, sewage works engineer and manager, Bradford.

M. B. E.

New M.B.E.s include MR. HARRY ANNIS, chief inspector, Metropolitan-Vickers Electrical Ltd.; MR. STANLEY FREDERICK HATHAWAY, senior experimental officer, National Physical Laboratory; MR. THOMAS HUGHES, chemist II, Royal Ordnance Factory, Ministry of Supply; MR. JOHN MATHER, workshop manager, Atomic Weapons Research Establishment, Aldermaston; MISS ISABELLA MINTO SLADE, information officer, British Iron and Steel Research Association; MR. CYRIL FELLS STACEY, lately senior experimental officer, Ministry of Supply; and MR. HAROLD BERTRAM WIGGINS, higher executive officer, Risley, UK Atomic Energy Authority; MISS VIOLET A. DAVIDGE, senior experimental officer, Ministry of Supply; and S. G. DUFFELL, senior experimental officer, Ministry of Agriculture, Fisheries and Food.

B. E. M.

MR. C. L. BEECH, foreman, British Chrome and Chemicals Ltd., Eaglescliffe; MR. W. H. BLANEY, head packer, National Physical Laboratory, DSIR; MR. I. COLLETT, head papermaker, Wiggins Teape and Co. (1919) Ltd., High Wycombe; MR. O. EDWARDS, research and development craftsman (special), Explosives Research and Development Establishment, Waltham Abbey; MR. L. N. HOWES, process supervisor, UK AEA, Harwell; MR. W. JOHNSON, process supervisor III, UK AEA, Aldermaston; and MR. F. C. MASON, chargehand, research and experimental mechanics, UK, AEA, Aldermaston.

★ NEW USES are constantly being found for that versatile plastics material polythene. The latest, which may be worth millions of pounds to Australian wool-growers is now being tested at Ouyen, Victoria. The aim is to save precious water supplies by the construction of polythene-lined dams that will not leak.

The method, it is suggested, should be combined with the recently discovered process of checking evaporation by spreading a thin film of cetyl alcohol over the surface of the water. The bottom and sides of the Ouyen dam have been covered with a thin polythene film laid in wide strips and heat-sealed.

So far the cetyl alcohol process has been used for dams up to two acres, but for larger ones new techniques are being sought.

★ MR. E. CARDY, sales manager of Potters Hygienic Products (London) Ltd., 81 High Street, Dunmow, Essex, who noticed my reference on 14 December to the new BS on 'Safety Colours in Industry' writes to say that his firm produce a range of translucent coloured lamp and glass lacquers. They will be pleased to send samples to readers in the new safety colour code of red-orange-yellow and green.

He adds that these lacquers are specially prepared for application to lamp bulbs and to glass and plastics signs by brushing, dipping and spraying. They are already being used or tested by a number of major industrial concerns.

★ A CASUALTY of the 'prevailing national and international financial situation' is the scheme of Magnesium Elektron Ltd., Swinton, Manchester, to erect a £1 million plant at Hopton, Derbyshire, for the extraction of magnesium from limestone deposits.

The project has been shelved until the situation improves, when a restart on the work will be considered.

★ LARGE companies with the problem of housing transferred staff can take heart from the 'victory' in the courts of two ICI employees over the tax authorities. The company compensate staff being moved for losses made when they sell their houses.

The Inspector of Taxes claimed that these payments were taxable. A legal complication arose when the Crown won action on this point in Durham against Mr. C. M. Jennings for assessment on £450 and lost a similar action in York when they claimed from Mr. L. H. Mayes for a tax assessment on £350.

A judgement in the Chancery Division by Mr. Justice Upjohn has cleared up this problem. It was ruled that the main object of the scheme was that the employees should be free from worry on a transfer. It was shown that to be a profit arising from employment, a payment must be made in reference to the services an employee rendered by virtue of his office.

The housing agreement formed no part of the employees' remuneration, nor did any payment under it. The payments had nothing to do with the office or service the employees had to render to the employers, and this, said Mr. Justice Upjohn, was fatal to the Crown's claim.

Mr. Jennings' appeal was allowed and the Crown was ordered to pay the costs. The inspector's appeal in the case of Mr. Mayes was dismissed, also with costs against the Crown.

★ FORTY PER CENT of companies in the UK have no technically qualified directors, while of all directors of engineering companies, less than 22 per cent have technical qualifications and of those, three-quarters are engineers.

One of the reasons why engineers are not making a greater contribution to top management was given this week by Sir Ewart Smith, a deputy chairman of ICI, when he presented the Graham Clark lecture on 'The engineer and management' to members of the institutions of civil, mechanical and electrical engineers. Sir Ewart said that this was due to the desperate shortage of technologists which was such that most were confined to 'specialist' jobs.

He did not think that engineers could shrug off responsibility for failures in industrial and political management. Since industrial civilisation was largely the result of the engineer's work and invention, it was for them to play a more active part in solving mankind's problems of management and organisation.

Sir Ewart is an engineer himself and is in fact the first engineer to present the Graham Clark lecture.

★ A DU PONT research 'task force' has succeeded in its efforts to convert formaldehyde, one of the older industrial organic chemicals into a plastics, Delrin acetal resin, that 'promises to do more jobs than any now in use.' The new plastics approaches metals like aluminium and zinc in strength and toughness. It is claimed to resist chemical and mechanical forces over a wide temperature range. Commercial production is scheduled to begin at a new plant near Parkersburg, West Va, in 1959. (See CHEMICAL AGE, 9 November, p. 764.)

Polymers of formaldehyde were noted when the compound was synthesised 90 years ago and a study of them in the 1920's laid part of the foundation of modern polymer science. Earlier long-chain polymers of formaldehyde were too weak and unstable to be of any value. But work, suspended during the war and resumed in 1948, led to the discovery of more stable high molecular weight polymers and a method for quantity production.

Although progress was slow, Du Pont gambled on the soundness of their chemists' estimates by forming a large technical task force to untangle some of the remaining mysteries of formaldehyde. In two years the group created what was to be known as Delrin, a polymer of very long chains made up of about 1,500 formaldehyde molecules. They went on to devise the workable production process that is now being translated into reality.

★ INVESTIGATORS at the research centre of Gulf Oil Corporation, Pittsburgh, US, have developed a method of detecting amounts of as small as one part per billion. The method is being used in refinery operations to detect arsenic and thus to prevent poisoning of platinum catalysts.

A technique which incorporates the Gutzeit police test for arsenic poisoning in humans, is used. Organic matter in a crude oil sample is destroyed chemically and the residue put into solution. This is treated chemically to produce arsine which in turn is reacted with sensitised paper. The Gulf method at this point uses spectrophotometry to determine the very low arsenic concentrations.

Similar techniques, developed separately, are applied to detect traces of other 'poisons' harmful in larger quantities of one part in one million or half million.

★ RECENT rededication of St. Bride's, Fleet Street's own parish church, by the Bishop of London, was of special significance to CHEMICAL AGE, which is published by Benn Brothers Ltd.

One of the first stalls to be endowed is in memory of Sir Ernest Benn, whose son, Mr. Glanvill Benn, is present chairman of the firm. The plaque on the stall, bearing the Benn coat of arms, is dated 1914, the year in which John Williams Benn, father of Sir Ernest, was created first baronet.

The rededication ceremony was graced by the presence of the Queen and the Duke of Edinburgh.

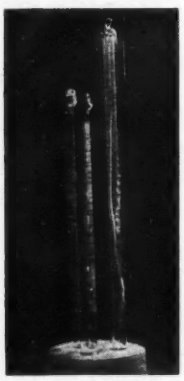
Alembic

MANCHESTER RIC EXHIBITION HELD IN SCIENCE COLLEGE

Left: Mrs. B. Lamb demonstrating the finalised version of the Tinsley polarograph minor with derivative circuit, made by Evershed and Vignoles Ltd. Centre: The Lovibond comparator and portable field kit for the determination of cholinesterase in blood is demonstrated by F. J. Heath, sales manager of The Tintometer Ltd. Right: The quantity of radioactivity absorbed by the human body can be assessed using the EEL universal densitometer, being demonstrated here by P. R. Chandley of A. M. Lock and Co.

THE Royal Institute of Chemistry, Manchester and District section, exhibition was held on 18 and 19 December in the main inorganic chemistry laboratories of the College of Science and Technology, Manchester.

James A. Jobling and Co. Ltd., Sunderland, showed a representative selection



The new type of capillary by Evershed and Vignoles Ltd. on show for the first time

from their standard range of Pyrex brand laboratory and scientific glassware. Early in 1958, it was announced, the number of lines sold will be halved. The company are to concentrate on a few standard lines in rather heavy demand, and cease manufacture of lines for which the demand may not exceed 100 a year.

New developments are to be seen on the stand of Donald Brown (Brownall) Ltd., Brownall Works, Lower Moss Lane, Manchester 15. A range of laboratory bench fittings was on view, for water, gas, compressed air, vacuum and steam services. The service fittings were shown in various finishes, but one of the newest was plastic coated. This type of fitting is claimed to be resistant to abrasion and to acid, alkali and solvent fumes.

A representative of the company told CHEMICAL AGE that the plastic was high impact type. The fittings are available in standard colours where colour coding is desired, azure and light blue, yellow, white, green, crimson and black.

All the fittings are available with 'above-bench' and 'front-of-bench' controls and incorporate new designs of plastic heads and covers for the control wheels and levers.

A. M. Lock and Co. Ltd., of Union Street, Oldham, showed a wide range of instruments for those firms for which they are agents.

Prominent was a Pye pH meter which had only one operating control. Also on view was an EEL Densitometer which, although not new, was shown in a new application—for the assessment of radiation activity to which a person may be exposed.

Stanton Instruments Ltd., of 119 Oxford Street, London W1, exhibited what was claimed to be the fastest balance of its kind in the world, the new single pan Ultramatic.

The Tintometer Ltd., Colour Laboratory, Waterloo Road, Salisbury, showed a new field unit for the estimation of spray compounds such as insecticides, i.e. for the rapid field determination of cholinesterase.

Evershed and Vignoles Ltd., Acton Lane Works, London W4, demonstrated a new type of capillary first discussed by Professor Heyrovsky, which produces a much smoother polarogram.

Baird and Tatlock (London) Ltd., Freshwater Road, Chadwell Heath, Essex, exhibited a new wide range oven for the first time. The oven is designed both for static operation with or without convected air flow, and for normal circulating or forced draught conditions by the addition of a circulating fan.

Electronic Instruments Ltd., Richmond, Surrey, showed a new automatic titrimeter.

Edwards High Vacuum Ltd., Manor Royal, Crawley, Sussex, showed rotary high vacuum pumps.

Quickfit and Quartz Ltd., Stone, Staffs, showed 'open neck' reaction vessels, which can be cleaned inside with ease. The range is from 700 ml. to 20 litre.

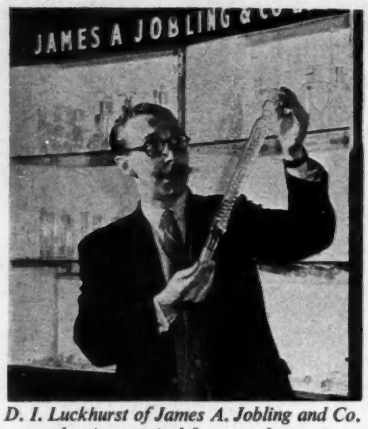
Three entirely new items were shown

Top left: Open-neck reaction vessels by Quickfit and Quartz being demonstrated by R. L. Fenwick. Top right: R. Hay of Donald Brown (Brownall) Ltd. demonstrating newly designed double swan neck water standard for laboratories. Bottom left: The BTL wide range oven is demonstrated by P. R. Busby. Bottom right: J. M. Blakeway of Colgate-Palmolive examining a Stanton Ultramatic balance

by Townson and Mercer Ltd., Beddingon Lane, Croydon, Surrey. A moisture meter in which the sample is dried *in vacuo* under infra-red heating enabled results comparable with those obtained by normal oven methods, to be obtained in a few minutes, it was claimed.

A new high temperature oven was shown, which has a normal maximum temperature of 420°C. In the range of thermostatic baths was the X27Major, designed especially to meet the IP and ASTM specifications for viscosity work.

New items of foreign manufacture exhibited by Hudes Merchandising Corp. Ltd., 52 Gloucester Place, London W1, included four current models of the single pan twin arm beam Selecta balances from Sartorious, one model including a new type of beam pointer.



D. I. Luckhurst of James A. Jobling and Co. showing a spiral form condenser

Candidates for Meldola Medal

APPLICATIONS for consideration for the 1957 Meldola Medal should be sent, either by the candidate himself, or by persons wishing to recommend him, to the president of the Royal Institute of Chemistry, 30 Russell Square, London WC1, before 28 February.

The award will be made to the chemist who, being a British subject and under 30 years of age on 31 December, 1957, shows the most promise, as indicated by his or her published chemical work brought to the notice of the Council of the RIC. There are no restrictions on the kind of chemical work or the place in which it is conducted.

The letter should be accompanied by six copies of a short statement of the candidate's career and a list of titles, with references of papers and other works published by the candidate, independently or jointly. Candidates are also advised to forward one reprint of each published paper.

Results of 1956 Chemical Census

GROSS output of the chemicals and allied trades in 1956, at £1,998 million, was £311 million higher than in 1954. Net output, at £612 million in 1956, however, was only £84 million higher than the 1954 figure. This output increase was achieved with very little increase in the industry's labour force. These results are disclosed in the provisional results of the 1956 production census.

Capital spending in the chemicals and allied trades totalled £115 million last year, a rise of £37 million over 1954. Spending on new buildings was £33 million, 13 million higher than 1954.

The following table is extracted from *Board of Trade Journal*, 20 December.

Industry and year		Gross output	Net output	Employment: Operatives	Employment: Others	Wages and salaries: Operatives	Wages and salaries: Others	Change during the year in: Stocks of materials and fuel	Change during the year in: Work in progress and stocks of finished products	Capital expenditure: Plant machinery and vehicles acquired	Capital expenditure: New building work
		£ million		Thousands		£ million					
Chemicals and allied trades	1954	1,687.2	528.9	279.0	121.6	125.2	80.5	+17.8	+19.0	78.9	20.3
	1955	1,882.3	582.9	288.9	129.7	142.1	90.2	+15.5	+20.8	81.1	23.4
	1956	1,998.1	612.5	285.6	130.5	149.9	98.9	+12.1	+13.7	115.3	33.3
of which:											
Chemicals (general)	1954	333.0	134.0	64.0	26.9	32.5	19.4	+ 3.6	+ 2.7	29.3	5.7
	1955	383.3	143.0	67.2	29.1	37.5	22.0	+ 4.5	+ 5.0	31.5	7.3
	1956	399.1	160.7	67.2	29.9	39.9	24.3	+ 1.4	+ 3.7	42.5	9.1
Drugs and pharmaceuticals	1954	120.5	62.6	33.0	16.6	11.1	9.7	+ 1.2	+ 2.6	2.8	1.2
	1955	143.0	74.4	33.7	19.1	12.7	11.7	+ 2.1	+ 1.7	3.9	2.0
	1956	139.5	74.4	33.3	17.9	13.1	11.8	+ 0.4	+ 1.9	5.0	3.9
Paint and varnish	1954	113.1	45.7	20.7	17.5	8.4	10.7	+ 1.0	+ 1.4	2.4	1.1
	1955	121.2	49.7	21.8	18.3	9.5	11.5	+ 1.1	+ 1.6	3.8	1.7
	1956	128.3	52.1	22.1	18.6	10.0	12.6	+ 1.2	+ 1.6	3.6	1.8
Soap, candles and glycerine	1954	94.1	28.7	14.5	7.7	6.1	4.5	+ 1.1	+ 0.4	2.9	0.5
	1955	98.1	28.3	14.0	8.4	6.6	5.6	— 0.7	+ 0.3	1.8	0.8
	1956	106.0	33.0	13.7	7.6	7.1	5.6	+ 1.4	— 1.0	2.3	0.7
Mineral oil refining	1954	304.6	37.0	12.3	4.1	6.6	2.6	+ 0.1	+ 3.2	13.2	2.8
	1955	318.7	47.3	12.4	4.3	7.4	3.0	+ 2.9	+ 8.6	10.8	2.3
	1956	340.4	46.5	13.6	4.7	8.7	3.8	+ 2.2	+ 2.6	17.7	4.3
Plastics materials	1954	83.1	32.6	14.2	7.9	7.5	5.5	+ 1.1	+ 1.4	4.9	1.5
	1955	100.2	35.3	15.7	8.5	8.9	6.2	+ 1.1	+ 1.0	5.7	2.3
	1956	104.2	35.5	15.7	9.3	9.5	7.3	+ 0.5	+ 1.0	12.2	3.4

Beilby Award Entries by 28 February

LAST date for recommendations for the Beilby memorial awards is 28 February. Application may be made either by the candidate himself or by other persons and should be sent to The Convenor of the Administrators, Sir George Beilby Memorial Fund, The Royal Institute of Chemistry, 30 Russell Square, London WC1.

The letter should be accompanied by nine copies of a short statement of the candidate's career and of a list of titles, with references, of papers or other works published by the candidate, independently or jointly. Candidates are also advised to forward one reprint of each published paper of which copies are available. The Beilby awards are made to British investigators in science.

More Chemicals Exported by Air

A GREATER volume of chemicals is being exported from the UK by air, although the total still represents only a small proportion of all chemical exports. In January to June, 1957, the f.o.b. value of chemicals exported by air was 3.1 million, or 2 per cent of total chemical exports which were valued at £136.1 million. In the second half of 1956, UK chemicals exported by air were valued at £2.7 million, or 2 per cent of total exports of £122.6 million.

More chemicals were also brought into the UK by air freight, the January-June 1957 c.i.f. value being £2.5 million, or 4 per cent of total chemical imports of £55.6 million. For the previous half-year, imports by air were valued at £1.9 million, or 4 per cent of a total of £50.3 million.

Polythene Film Used for Improving Crop Yields

Black polythene film can be used to improve yields and obtain earlier marketing of crops, according to Bakelite Ltd., 12-18 Grosvenor Gardens, London SW1. Extensive tests carried out at agricultural experimental stations have shown the film has a number of advantages when used as a mulching-type material, claim the company.

The film increases the soil temperature, forcing seeds to germinate more quickly and plants to grow more readily. It is used in widths of three feet and a thickness of 150 gauge (0.0015 in.). The film is unrolled over the ground and the edges securely weighted down with soil.

Accident in Diphenyl Plant

There was an accident at the Newport factory of Monsanto Chemicals Ltd. on 19 December when a fire broke out in the diphenyl plant. One man was badly burned and has since died. The Newport fire service helped the works brigade and the fire was under control in less than 20 minutes. Cause of the fire is not yet known, and it is not expected that production will be held up for long.

Analytical Review

SOLVENT EXTRACTION OF ANIONIC METAL COMPLEXES

By
Dr. T. S. West

In the second of his monthly reviews for recent developments in analytical chemistry, Dr. West reviews:

- **A versatile new separation method based on the solvent extraction of anionic metal complexes of long chain amines.**
- **The evolution of a series of sensitive reagents for the determination of osmium.**
- **Two new papers on complexometry from the laboratory of Professor Schwarzenbach.**

IN 1948, E. Lester-Smith and J. E. Page(1) reported on the remarkable ability of certain long chain amines, particularly di-*n*-octyl methylamine, to bind most strong mineral acids and many water soluble organic acids as salts which could be virtually quantitatively extracted into chloroform. The practical importance of this procedure is generally well realised since it offers a very neat method for the removal of acidity from an aqueous solution without causing any increase of ionic strength. In their paper they pointed out the potentialities of the method for extracting metals in the anionic form, e.g. vanadate or chromate.

A paper from the Oak Ridge National Laboratory in a recent issue of *Analytical Chemistry* shows how this suggestion has been followed up(2). Several amines were first tested for the extraction of HCl, HNO_3, H_2SO_4, H_3PO_4; the most promising were tri-*n*-benzylamine and di-*n*-octyl methylamine. These amines were selected for further study. Polonium 210 tracer forms an anionic complex which is extracted to the extent of 99.3 per cent from 6M HCl by 1⅓ volumes of 5 per cent of tri-*n*-benzylamine in chloroform. Plutonium 239 tracer is extracted to the extent of about 74 per cent from 9M HCl-0.5M HNO_3 by an equal volume of 5 per cent reagent in chloroform. Plutonium (VI) was found to extract from hydrochloric acid solution in the presence of sodium dichromate with tri-*n*-benzylamine in chloroform. Tracer solutions of zirconium 95 and protactinium 233 were extracted from 11-12 N HCl to the extent of about 99 per cent with 5 per cent di-n-octyl methylamine in xylene.

Thorium Not Extracted

The behaviour of hafnium 181 was similar to that of zirconium 95. Thorium was not extracted by these systems and it was therefore possible to achieve a good separation from protactinium. Also by using hydrochloric acid of intermediate strength, e.g. 6M (or less), protactinium could be separated from zirconium and all other elements that do not form anions under those conditions.

By use of this technique of inorganic anionic liquid-liquid extraction it has been shown that it is possible to separate zinc from cobalt, manganese, nickel and iron and also to separate cobalt, zinc and iron from other elements which do not form anionic complexes with chloride ion(3). The method has been used to separate niobium and tantalum(4),(5). Uranium may also be extracted from solution in many dilute acids, e.g. H_2SO_4, HCl, HNO_3, H_3PO_4 etc. by means of this technique(6).

There is little doubt that this new work by Moore and his associates on the reagent devised originally by Lester-Smith and Page has added greatly to the scope of liquid-liquid extraction techniques in inorganic chemistry. It is very probable that many longstanding problems may be cabable of resolution by this new technique provided a suitable aqueous system can be produced in which the desired constituent is present in an anionic species, whilst the unwanted material is in a cationic form. The course of any separation cannot be predicted as easily as might appear at first sight and indeed the original workers were able to separate amino acids from acid-protein hydrolysates because the amino acids are not themselves extractable. There is little doubt that the technique may challenge the use of anion exchange resins in many problems. It is fast and easy to operate, particularly for continuous countercurrent work. The amines are unfortunately rather expensive, but it may well be that less costly reagents will soon be available commercially.

Determination of Osmium. From the laboratories of Professor Yoe of the University of Virginia comes a report of yet another class of organic reagents—this time for the determination of traces of osmium. Thiourea is perhaps the most successful of the reagents hitherto used to determine osmium, but the increasing use now being made of this extremely toxic platinum metal in fields such as biology, metallurgy and catalysis makes very timely the evolution of this now yet simple and accurate method of analysis.

Steel and Yoe(7) have shown that as a class, naphthylamine sulphonic acids react with the osmate ion to form very intense coloured products absorbing in the region of 580 mμ. Sensitiveness as high as one part in 20 x 10^6 were found. 1-Naphthylamine-4,6,8-trisulphonic acid was selected as one of the most favourable reagents. It gave maximum colour intensity within a period of one hour and the colour, due to a 1:1 complex between osmium (VI) and the reagent, was stable for over a month. The complex was not extractable into water immiscible solvents. Because the reaction was not specific, a separation technique based on distillation of the tetroxide from HNO_3 and subsequent reduction to the hexavalent stage by hydroxyl ions was used.

It was shown that in every case where the sulphonic acid groups sterically hindered the amine group, slow development of colour was caused. Replacement of the amino hydrogen by phenyl or methyl groups prevented reaction. These facts and other data suggest that the amino group is functional in this class of reagent and presumably the nitrogen donates an electron pair to the osmate ion for octahedral formation. The reagents are readily available or relatively easy to synthesise.

Developments in Complexometry. The number of papers at present appearing on the use of EDTA probably exceeds that which has appeared on any other reagent at any other time. Generally, the flood of papers is concerned with the application of the reagent to various problems or to the use of new complexometric indicators. Little fresh work has appeared on the development of new complexing agents.

More Selective Reagents Needed

There is now considerable need for the development of more selective reagents than EDTA and any move in this direction is to be commended. The appearance in *Helvetica Chimica Acta* of two papers from Professor Schwarzenbach's laboratory at Zurich is doubly welcome in view of his long silence in this his own field, and since one of them sheds light on this problem of specificity. Schwarzenbach, Senn and Anderegg(8) report that complexing agents of the type

$$(HO_2C-CH_2)_2=N-(CH_2)_n-N=(CH_2CO_2H)_2$$

where 'n' varies from two to eight have been investigated. The stability constants of the 1:1 complexes of Ca^{2+}, Cd^{2+} and Hg^{2+} were determined for nearly the whole series and a few values for Mg^{2+} Sr^{2+}, Ba^{2+}, and Co^{2+}. A marked decrease in stability constant occurred for increase of 'n' from two to four but thereafter an almost constant value was reached which did not alter appreciably with increase in chain length.

Perhaps the most interesting feature—and certainly a most significant one—is that the stability constant for mercury (II) was practically unaffected. Log K for Hg-E.D.T.A. (n=2) was 21.8 and for n=3,4,6 and 8 it was 19.7, 20.8, 21.38 and 21.83 respectively. Thus, a certain specificity for mercury (II) has been introduced. Replacement of one or two $-(CH_2)-$ groups in the chain by -0-, -S- or $-N(CH_3)-$ groups increased the stability to a great extent if the metal atom concerned was capable of co-ordination with

the new donor atom to form five-membered chelate rings. The introduction of the new electron donor atom into the complexone molecule again shows trends of specificity. All three made for more stable mercury complexes, and while the -S- group had a depressing action on the stability constant of cadmium chelates, the -N(CH_3)- group was very beneficial. The -O-group also appeared to favour complex formation with the alkaline earths whilst the -N(CH_3)- group had little effect and the -S- group was harmful.

The second paper from Schwarzenbach's(9) laboratory is concerned chiefly with the measurement of stability constants of metal chelate compounds. It is based on measuring the equilibrium potential of a mercury electrode system in which Hg (II) ion is in competition with another metal ion M^{v+} for a complexing agent $L\lambda^-$. From the exchange constant thus obtained the K values for complexes $ML_n^{v-n\lambda}$ can be obtained. This method, termed the pHg method by Schwarzenbach and Anderegg because of its analogy to Bjerrum's pH method, was used for the determination of the stability constants of the metal chelates of EDTA and other sequestering agents.

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US Firm Releases Details of New Route to Acetylene

DETAILS of an improved technique for the manufacture of acetylene have very recently been revealed by Eastman Chemicals of the US. The new process was described by G. A. Akin, T. F. Reid and R. J. Schrader of Eastman to the American Institute of Chemical Engineers, Chicago. High-temperature breakdown of saturated hydrocarbons are involved.

According to Eastman Chemicals, the process is different from any previously disclosed method for making acetylene. The process also yields ethylene. Investigations have been carried out over the past 12 months at a semi-works plant able to turn out a million lb. a year of acetylene plus ethylene. For the past six months the plant has been making each of these products in pure form.

First stage in the process is the heating of a fuel such as natural gas to 600°C in a preheater. The hot fuel then goes to the burner in a furnace combustion chamber, to which also goes either oxygen or air mixed with a metered amount of low-pressure steam and previously heated to 600°C in a second preheater. About 95 per cent of the stoichiometrically required amount of oxygen or air is used. Calculated flame temperature is 2000°C. Hot combustion products are discharged from the combustion chamber through a restricted opening at relatively high velocity.

In a third preheater are heated hydrocarbon cracking feed—propane or natural petroleum—and some low-pressure steam. This mixture is fed into the stream of high-velocity combustion products immediately after they leave the combustion chamber. In a venturi section are mixed cracking stock and combustion products which pass into the reaction zone. The cracking stock is dissociated completely in this zone to form unsaturated products which are quickly cooled with a water spray to prevent further decomposition.

In the exit stream are mainly carbon dioxide, acetylene, ethylene, carbon monoxide, hydrogen, methane and in the case of air combustion, nitrogen. This stream is processed to separate the desired products. Purified acetylene and ethylene are recovered by the Hypersorption process licensed from Union Oil, and selective absorption. By-products such as higher acetylenes, aromatics and tar are stated by Eastman Chemicals not to be a major problem.

In this method of producing acetylene from saturated hydrocarbons, heating needed to promote the endothermic reaction must be rapid and uniform. In the Hüls process heat is furnished by an electric arc, in the Wulff process by a regenerative furnace and in the Sachsse process by partial combustion. Disadvantages of these processes are that the arc process requires considerable electric power, the regenerative furnace involves cyclic operation and the partial combustion process demands a relatively large amount of oxygen. Eastman's patented process utilises a specially designed furnace capable of withstanding temperatures up to 2500°C. Stabilised zirconia is used as the interior construction material. It is stated that individual furnaces have been operated for as long as 100 days and the company believes that furnaces can be built to operate satisfactorily with maintenance only once a year.

SIT Forms New Section

Formation of a Nottingham section of the Society of Instrument Technology has taken place. The chairman is Professor J. E. Parton, University of Nottingham and hon. secretary is Mr. W. H. Thomas, instrument division, Ericsson Telephones Ltd., Nottingham.

Proposals have been made for the formation of a Grangemouth section of the society and it is expected that it will be in operation in three or four months. At present the Scottish section holds its main meetings in Glasgow which is a considerable distance from Grangemouth.

SAC Symposium on Microchemistry

A SYMPOSIUM on microchemistry will be held at Birmingham University on 20 to 27 August 1958 inclusive. Organised by the Midlands Section and Microchemistry Group of the Society for Analytical Chemistry, it will be under the patronage of the International Union of Pure and Applied Chemistry.

Arrangements are nearing completion. Plenary lectures will be given by: Professor Dr. Eng. Fritz Feigl (Brazil), Professor Dr. H. Leib (Austria), Professor A. A. Benedetti-Pichler (US), Dr. R. Belcher (UK).

Lectures will also be given by other chemists of international repute. The following list is by no means comprehensive, but indicates some of the subjects to be covered:

Microidentification of organic compounds, with particular attention to biological systems; microbiological assay of antibiotics, vitamins and amino-acids; microdetermination of physical constants; radioisotopes in microbiochemical research; emission spectroscopy; new chelating agents and metal indicators; flame photometry; practical applications of chemical microscopy; organic functional group analysis; inorganic microanalysis; quantitative analysis in the infra-red; compulsory microanalytical teaching, etc.

Lectures will take place in several streams and time will be devoted to the discussion of papers. Time will also be devoted specifically to discussion sessions to be opened by chosen specialists. There will also be an exhibition of apparatus, demonstrations of new techniques, a ladies' programme and a programme of works' visits and entertainment, in addition to the scientific programme.

Programmes and application forms, giving more detailed information, are now available and can be obtained on written application to the honorary secretary: W. T. Elwell, F.R.I.C., ICI (Metals Division) Ltd., P.O. Box No. 216, Research Department, Kynoch Works, Witton, Birmingham 6. Envelopes should be marked 'Symposium.'

Chemical Society Anniversary Meeting

THREE symposia will be held at the anniversary meetings of the Chemical Society in Bristol on 31 March to 2 April 1958. They will be: 'Developments in aromatic chemistry', I—Biogenesis and metabolism of aromatic compounds, II—Non-benzenoid conjugated systems and III—Benzene and fundamentals of conjugation; 'Applications of electron and nuclear resonance in chemistry' and 'Recent work on the inorganic chemistry of sulphur'.

Apart from the symposia, a full programme of social events and works visits has been arranged. Visits will be made to the South Western Gas Board, Imperial Smelting Corp., Long Ashton Agricultural Research Station, National Coal Board, Coal Research Establishment, Albright and Wilson Ltd., and The Distillers Co. Ltd.

Fellows are advised to make their applications as soon as possible, and in any case before 1 March 1958.

RECENT DEVELOPMENTS IN ANALYTICAL CHEMISTRY

Meldola Lecture by Dr. T. S. West

SOME of the more recent aspects of the research work which was submitted for the award of the 1956 Meldola Medal were surveyed by Dr. T. S. West, Meldola Medallist for 1956, when he received the Meldola Medal from the President of the Royal Institute of Chemistry, Professor William Wardlaw, C.B.E., on 10 December 1957, at a joint meeting of the Institute and the Imperial College Chemical Society, held in the main chemistry lecture theatre, the Royal College of Science.

Dr. West said that in the inorganic section, attention had been focused on some of the analytical applications of ethylenediamine tetra-acetic acid (EDTA). The remarkable chelating ability of this reagent was typified by describing a method for the titrimetric evaluation of barium sulphate precipitates in which the barium sulphate was dissolved in an excess of the reagent and determined by back titration. A rapid non-empirical method for the determination of sulphur in steel using this procedure in combination with a solvent extraction process was described.

Some interesting effects of EDTA on the oxidation potential of some redox systems were then discussed. Particular reference was made to the stability of the cuprous chelate of EDTA and further evidence derived from a study of the polarograms of the metal chelates was examined. It was demonstrated that the normal reaction between Fe^{3+} and I^- ions was reversed at pH 3–5 in the presence of excess of EDTA, thus making possible the titration of iodine with ferrous sulphate. Ferrous dihydrogen ethylenediamine tetra-acetate can be used as a reductimetric reagent in such a way that it has the reducing power of titanous chloride and yet has a greatly superior stability.

Limitations of EDTA

Some of the limitations of EDTA as a titrimetric reagent for metal ions were pointed out, particularly with respect to the lack of really satisfactory metallochromic indicators. A selection of five new indicators taken from a range of commercially available *o,o'*-dihydroxy azo dyes was discussed and a practical demonstration was made of several end-points. Dr. West indicated that Solochrome Black 6B (CI No. 201) gave a Mg^{2+}/EDTA end-point which was superior to that of Eriochrome Black T. Moreover, the ethanolic solution of the indicator was stable for at least four months, whereas that of the conventional indicator began to deteriorate after three to four days. Acid Alizarin Black SN (CI No. 337) gave a very sharp Ca^{2+}/EDTA end-point. It might be used in conjunction with a diethylamine buffer for the titration of Ca^{2+} in presence of Mg^{2+}. Up to the ratio $Ca^{2+}/Mg^{2+} = \frac{1}{2}$ it was superior to all other indicators for this purpose so far examined by the speaker. Omega Chrome Red B (CI No. 652) was an excellent indicator for the titration of nickel in hot solution over the range pH 4.5–11.5. The pink to yellow end-point might profitably be screened by addition of Xylene Cyanol FF. Fast Sulphon Black F (CI No. 306) could be used for the EDTA titration of Cu^{2+} in the presence of ammonia. Several unusual features of this reagent were noted, e.g. the specificity of the colour reaction and the structure of the organic molecule. Chrome Fast Black PV (CI No. 170) might be used for the EDTA titration of Mg^{2+}, Ca^{2+}, Zn^{2+}, etc. This indicator had also some rather curious properties. The action of Fe^{2+} and Fe^{3+} was also discussed.

A new reagent—Alizarin complexone—derived from 1,2-dihydroxyanthraquinone and imino diacetic acid was an excellent indicator for the chelatometric titration of several metal ions, both in acid and in alkaline solution. It was free from interference by traces of iron, etc. A possible mode for its indicator action, based on spectrophotometric evidence, was explained. Dr. West said that some of its metal chelates showed a remarkable resistance to decomposition.

Some new chelating agents synthesised by the speaker and his co-workers were next described. Amongst others, particular attention was devoted to the tetra-acetic acids of 1,2-diamino*cyclo*pentane, 4,-methyl-1,2-diamino*cyclo*hexane, 1,2-diamino*cyclo*heptane, etc. Tentative figures for the stability constants of some of the metal chelates of these compounds as established from polarographic data showed that these substances were possessed of a very high chelating ability. Some unusual features of the polarograms of certain of the chelates were indicated and a practical demonstration was made of one of the unusual reactions involved.

In the realm of developments in organic analysis, attention was restricted to recent work of the speaker and his associates on the development of a new field of ultimate and functional group analysis on the submicro scale. These analyses were as accurate as the conventional micro methods but required a sample weight of only 50 micrograms. A simple balance for weighing such samples with the necessary degree of accuracy was described. Some details were given of the methods devised for carbon and hydrogen, nitrogen (in many different types of compound), $-OCH_3$, $-NCH_3$, etc. Some of the apparatus used in submicro work was displayed, including a sub-micro (x4) sample of sucrose.

In his concluding remarks, Dr. West made acknowledgment of his thanks to some of the many people who had helped him forward on his way to winning the 1956 Medal and stressed his gratitude to the DSIR for the award of a senior research fellowship for the development of the sub-micro organic analysis programme.

Fisons Form Fertiliser Division

FISONS fertiliser business has been formed into a separate division which will operate from 1 January under a divisional board of directors. Sir Clavering Fison, chairman of the company announcing this change, has stated that in addition to a number of directors of the main board of Fisons, the following have been appointed to the fertiliser division board. The directors are Mr. A. Gillies, Mr. E. R. Milner-Moore, and Dr. J. A. Storrow, the director of Levington Research Station, Mr. P. T. Chevalier, a vice-chairman of the company, has been appointed chairman of the fertiliser division, Mr. J. Watson Napier, managing director, and Mr. G. V. K. Burton, assistant managing director.

Mr. A Wormald, while remaining commercial director of Fisons Ltd., has been appointed managing director of the chemical division. Other appointments in this division are: Mr. B. D. Thornley to be chairman of Benger's; Mr. A. Robinson to be chairman of Whiffen and Sons; and Mr. A. S. Woodhams to be acting chairman of Fisons Chemicals (Export). Mr. Wormald remains chairman of Fisons Pest Control and has also been appointed chairman of Genatosan.

Sodium Chlorate

The price of sodium chlorate, quoted in 'British chemical prices' (last week's issue, page 1060) should have read £88 10s. Note of an increase to this figure arrived too late for inclusion last week.

Port of Hull's Traffic in Chemicals

THE returns for the four weeks ended 1 December, issued by the British Transport Commission for the port of Hull, show that inward traffic included 7,356 tons of chemicals and chemical fertilisers, compared with 5,029 tons for the corresponding period a year ago. The aggregate for the 48 weeks of 1957 is 86,563 tons against 96,119 tons.

For outward traffic, chemicals and chemical fertilisers exports totalled 2,224 tons for the four weeks ended 1 December, against 1,151 tons for the corresponding period a year ago. The total for the 48 weeks of 1957 is 18,026 against 20,080 a year ago.

ICI Use Dummy Material for Blackpowder Trials

A test powder in which potassium nitrate was partially replaced by potassium chloride was used for proving trials at the blackpowder department of Imperial Chemical Industries at Ardeer. 2,000 lb. of this dummy material was milled, pressed and broken before passing through the new corning house. The proportion of charcoal and sulphur in the new material remained the same.

By using the dummy powder it was possible to watch the process at close hand explained Mr. D. Rodger, superintendent of the blackpowder department. 'This would have been quite impossible had the powder been live.'

New Design for Nuclear Plants Eliminates Reactor Runaway

DEVELOPMENT of a radically new design for nuclear power plants has been announced by Dr. Lyle B. Borst, chairman of the physics department of New York University's College of Engineering, New York, US. The new device, called the 'convergatron', is stated to eliminate the danger of reactor runaway in atomic reactors.

Dr. Borst investigated the application of the convergatron to utility power plants. Two new types of power plant resulted: a fast neutron breeder convergatron reactor and a natural uranium and water system. Uranium and water cannot produce a full chain reaction regardless of their proportions, but uranium and water with the convergatron can make an efficient power plant. Such a system, Dr. Borst states, would never have a full chain reaction and could be operated by adding a few neutrons amplified to the level required for power production.

A subcritical reactor controlled by a small neutron source and amplified by the convergatron is envisaged. The convergatron is a neutron amplifier in which the neutron output is greater than the input. In a manner analogous to that of the vacuum tube and the transistor, it magnifies the flow of neutrons. A series of convergatrons would amplify neutrons from a weak source to a large power reactor, and yet the power plant itself would shut off upon the removal of the source. No other control system is required. Because all parts are subcritical, the danger of losing control of the chain reaction is removed.

The convergatron consists of three sections—one containing the pure neutron moderator such as plain water or graphite; one containing atomic fuel (unenriched uranium 238); and a thermal neutron barrier such as cadmium. Fast neutrons from the fission of uranium in the fuel zone penetrate the cadmium barrier. They are slowed by the moderator to become thermal (very slow) neutrons that activate the next fuel zone. The fast neutrons starting in the reverse direction are slowed by the moderator until they can no longer penetrate the cadmium.

Each fuel zone receives neutrons from the preceding stage. Therefore, each succeeding stage can operate at a higher power while still depending upon the preceding stage for its excitation. Modifications of the simple amplifier to include controllable feedback and non-linear effects give the convergatron the range of characteristics to be found in vacuum tubes and transistors.

In a subcritical reactor the number of neutrons produced has a fixed relation to the number introduced.

Also by using the controlled amplifying properties of the subcritical reactor in an arrangement in which the neutrons go only one way, any degree of amplification can be achieved while the operator maintains complete control by means of the neutron source.

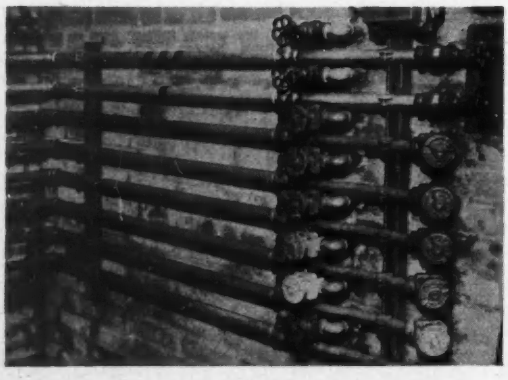
Dr. Borst suggests that the convergatron, acting as a power source through heat transfer, will be able to generate enough power to make the system practicable in many areas of the world.

Use of Unistrut by Vitamins Ltd

EXTENSIVE use of Unistrut steel channel framing system is being made by Vitamins Ltd. to support a wide variety of installations at their rapidly expanding Crawley factory. More than 2,500 ft. of Unistrut, made by Sankey-Sheldon Ltd., 46 Cannon Street, London EC4, is in use and more is to be installed.

In the fine chemical manufacturing departments, all the pilot plant vacuum distillation units have their condensers, glass pipework and all service pipelines supported by this channelling. Unistrut concrete inserts fixed flush with the walls are used to carry service mains through pipe ducts interconnecting the various chemical production buildings. In the chemical production section, Unistrut supports service pipes, including glass pipelines, pressure gauges, adjacent to reaction vessels.

Use of this channel has enabled a complex set of pipe runs to be set up on the outside walls of fume chambers so that the services required in the chambers can be controlled without entry.



Unistrut steel channel framing system supporting pipe runs installed behind a fume chamber, so that services can be controlled without entering the chamber. The closure strip which covers the channel slot has been removed

First Commercial Cockcroft-Walton Accelerator in US

THE first commercial Cockcroft-Walton accelerator produced in the US is being installed at the University of Arkansas. Its manufacturer is Applied Radiation Corp. The 350,000-volt machine, which consists of four parts: a high-voltage power supply (voltage multiplier), an ion source, an evacuated accelerating tube and a target, will accelerate a 400-microampere beam of positive ions to generate neutrons of various energies for research in nuclear chemistry and physics.

Dr. Richard Fink, who will be in charge of Arkansas' accelerator, expects the machine to yield up to 10^{11} neutrons per second by bombarding tritium with positively charged deuterons. Space is provided for addition of a subcritical neutron multiplying assembly which will give large thermal neutron fluxes comparable to a reactor. Later, by expanding the accelerator to 500,000 volts and 3,000 microamperes, and by introducing a new bombardment technique, the neutron yield is expected to increase many times.

The Cockcroft-Walton accelerator is valuable as a high intensity source of monoenergetic fast neutrons. For maximum neutron yield, the $T(d,n)^4He$ reaction is employed. Neutron production is limited only by danger of overheating the classical tritium-soaked zirconium target with consequent loss of gaseous tritium. By bombarding a massive silver target with a mixed triton-deuteron beam, as proposed by Dr. C. D. Moak of Oak Ridge National Laboratory, Dr. Fink hopes to obtain a regenerating target which will both increase the neutron yield far beyond 10^{11} and at the same time gain longer target life than possible with earlier methods.

In addition to tritium-zirconium, other targets of deuterium-zirconium, rotating deuterium ice, lithium and beryllium can be readily interchanged for the production of copious yields of neutrons of various energies between thermal and 14 Mev.

The accelerator's power supply is completely exposed. While this technique results in larger accelerator dimensions in order to hold the required voltages, Applied Radiation engineers found housing requirements for both atmospheric and the more expensive pressurised machines were comparable.

Scholarships in Glass Technology

Scholarships in glass technology at Sheffield University are available to students of physics and chemistry about to leave school. The Worshipful Company of Glass Sellers of London offer scholarships which, in suitable circumstances, qualify for supplementation by the Ministry of Education up to the full value of State Scholarships. The scholarship examination, which will begin on 24 March 1958, consists of papers in chemistry, physics, and pure mathematics, together with an English language paper. Further particulars are available from the Registrar, University of Sheffield, Sheffield 10.

Behaviour of Radioisotopes in Sewage Treatment

GENERAL principles on which maximum permissible levels of irradiation were fixed were discussed in a paper by A. W. Kenny, radiochemical inspector, engineering department, Ministry of Housing and Local Government, at a public health division meeting arranged in conjunction with the British Nuclear Energy Conference. Mr. Kenny showed that with present usage of radioisotopes, these levels were not being exceeded. Consideration was given to the contamination of drains, hazard to workers in sewers and at sewage disposal works, and the effect of radiation on sewage-purifying organisms. The behaviour of certain radioisotopes during sewage purification, the discharge of radioactive sewage effluent into rivers, and the concentration of radioisotopes in sewage sludge were also discussed. The disposal of sewage from the premises of the Atomic Energy Authority, on which so much important research on atomic energy and atomic weapons development is carried out, was excluded. It was stated that at one works of the Authority, the Radiochemical Centre at Amersham, discharge to sewers did take place, but that was a special case.

Levels of Irradiation

From the evidence accumulated to date, there had now emerged a widely accepted generalisation that a worker occupationally exposed to ionising radiations would suffer no harm provided that no organ of his body received more than 0.3 rad/week. It was however, thought undesirable to allow the general public to be irradiated to this level. For them, the recommended level was one-tenth of this figure. The basic problem with radioactive discharges to sewers was to set limits for the concentration of each radioisotope present, so that the total amount of radioisotope at any point where the public had access, was insufficient to irradiate any one with more than 0.03 rad/week on the average.

From present usage can be determined, what radioisotopes have to be considered and in what approximate concentrations in sewage. This data was available in the records kept by the Atomic Energy Research Establishment, and the Radiochemical Centre at Amersham, said Mr. Kenny. First, there was the use of radioisotopes in hospitals. For diagnosis, only small quantities were needed, but for therapeutic use, to destroy body tissues, usually cancerous tissue, much larger doses were necessary.

The principal isotopes used were radioiodine and radiogold. For the treatment of cancer the dose was 100 mc or more; for overactive thyroid the dose of radioiodine was about one-tenth of this value. In addition to these, radiophosphorus, radiosodium, and radiobromine had found important applications. More recently radiochromium and radioyttrium had been used in increasing amounts. Radiosulphur and radiostrontium had only found limited applications. Many of these radioisotopes were adminstered orally and excreted from the patients by natural process, but some were injected into body cavities or introduced in closed bags. Radiogold and radioyttrium were injected and left to decay in the body, they did not enter the body metabolism and were not excreted.

As a result of such considerations, the problems which require examination arise from (1) occasional discharges of 70 mc or more of radioiodine discharged largely in the urine from patients treated for cancer of the thyroid, (2) occasional discharges of 10 to 30 mc of radiobromine and radiosodium and (3) a more or less continuous discharge, usually no more than 1 to 2 mc/day from each patient treated, of these and other radioisotopes, principally, radiophosphorus, and radiosodium.

There might be many communities where the only discharge of radioisotopes to the sewers was from hospitals and in any case, even in large industrial cities, such discharges would normally exceed those discharged from factories.

Contamination of drains was investigated some years ago at Baltimore, US. Radiophosphorus was the more strongly adsorbed and was apparently assimilated into the metabolic processes of the slimes. It was, therefore, clearly desirable to check the level of radioactivity on drains and sewer walls, and to determine by measurement under actual conditions whether levels built up under conditions of continuous use were hazardous to plumbers repairing the drains or sewer workers in the sewers. A recent survey in the US indicated that about 40 per cent of radioisotope users discharged to the sewers and no hazardous build-up of radioactivity had been reported.

The behaviour of several isotopes expected in sewage could be predicted. Most experimental work on the biological behavour of radioisotopes had concerned radioiodine and radiophosphorus. The amount taken up on filters or on activated sludge was not sufficient to be hazardous to workers. Only if relatively large amounts of a long-lived radioisotope like cobalt-60 were discharged to the sewers would hazardous levels build up. The radioactivity taken up by the organisms was mainly radiophosphorus. Studies of adsorption on river silts showed considerable capacity to remove radioisotopes. In conclusion Mr. Kenny pointed out that it was conceivable that the use of radioisotopes would so increase, because of the enormous quantities of fission products available from Britain's power programme, that conclusions reached on the basis of the present usage would no longer hold.

ABRAC TO MARKET GERANIOL ON COMMERCIAL SCALE

AN announcement stated to be of great significance to perfumery was made by Dr. W. David Stallcup, vice-president in charge of the Glidden Company's southern chemical division, when he stated that synthetic geraniol was now being produced on a commercial scale.

The Glidden Company, furthermore, announce an arrangement with A. Boake, Roberts and Co. Ltd. (ABRAC), of London, England, to manufacture geraniol in Europe. The wide experience of ABRAC in the perfumery field has been drawn upon in establishing the olfactory standard required by the soap and perfumery industries, and the same close collaboration in the development of new aromatic products arising from the commercial production of geraniol is envisaged.

The considerable importance of this scientific achievement will be readily appreciated by perfumers everywhere, since it marks a turning point in the long history of aromatic chemical production. It is the culmination of a research programme going back 12 years, which is expected to lead to a range of terpene alcohols and related aromatics of extreme purity, stable prices and plentiful supply. According to Dr. Stallcup, these products, of which geraniol is an example, are synthesised from turpentine by entirely new methods developed in Glidden's research laboratories. For the first time geraniol is made available in the US from raw materials entirely of domestic origin and not subject to quality vagaries of soil, climate and locale. Also Dr. Stallcup states that the new route to geraniol assures consumers of supply regularity, price stability and material uniformity.

Geraniol standard is now available in quantity. It is of extremely high quality, having a minimum total alcohol content of 98 per cent. While containing the alcohols associated with the product derived from citronella oil, it is free from terpenes and sesquiterpenes. Dr. Stallcup expects that this geraniol will be used as a direct replacement of high quality geraniol produced from citronella oil. Geraniol standard is readily available to consumers at competitive prices.

Detailed information concerning these products may be obtained by writing to Glidden International CA, Southern Chemical Division, PO Box 840, Nassau, Bahamas, or to A. Boake, Roberts and Co. Ltd., aromatics and perfumery division, Stratford, London, England.

BAYER REPORT SALES INCREASE OF 16 PER CENT

SATISFACTORY results in the past year are attributed to the starting-up of new installations, especially for iscocyanates, fully-synthetic fibres, caprolactam and polyacrylonitrile. This is reported by Farbenfabriken Bayer AG, Leverkusen, who are the first German chemical producers to present an interim report on 1957 to their shareholders. Sales have increased by 16 per cent—11 per cent in 1956—to DM1,850 million (£168 million), and exports rose slightly more than home sales, with the result that their share in total sales advanced from 40 to 41 per cent. Above-the-average sales increases were noted in pharmaceuticals, fibres and plant protection chemicals.

Capital expenditure last year exceeded DM 250 million (£22.7 million) in domestic plant and DM 36 million (£3.27 million) in foreign plant, notably in the US, Brazil and Argentine. Less than half of new investments at home went into the main plant at Leverkusen. Capital expenditure on the new production sites at Uerdingen and Dormagen for the first time in the company's history surpassed those at Leverkusen, largely, it appears, because of the heavy cost of the titanium dioxide factory at Uerdingen, the first section of which is now operating. The company's labour force increased in 1957 by 2,800, or six per cent, to nearly 50,000, and the total salaries and wages by nine per cent to DM 357 million (£32.45 million). Sales per worker rose by nearly 10 per cent to DM 37,000 (£3,354 approximately), while wages advanced by only three per cent. The Bayer management attributed the favourable financial trend indicated by these figures to investment activity with the deliberate aim of making production more efficient and to the regressive movement of costs as a result of higher output rates.

For the West German chemical industry as a whole, figures for the whole of 1957 are not yet available. On the showing of the first ten months, however, which saw a rise by 13 per cent compared with 1956, total sales of DM 17,500 million (£1,600 million) may be anticipated, compared with DM 15,400 million (£1,500 million) in 1956. Chemical exports from the Federal Republic showed a 20 per cent increase up to the end of October and may, if the last two months were not unexpectedly disappointing, amount to DM 4,500 million (£400 million) for the whole of 1957. Sales to other Common Market countries do not appear to have increased more than home sales, but shipments to overseas destinations, notably to Latin America, the US and Egypt, showed very substantial advances. Canada and Australia were among the few overseas markets in which German chemical exporters did not fare so well last year.

It is interesting to note that chemical imports into the Federal Republic last year increased relatively by as much as West German exports—from DM 1,340 million (£122 million) in 1956 to about DM 1,600 million (£154 million)—and much more than the domestic sales of the West German chemical industry. This is not due to larger arrivals of raw materials, which now account for one-fifth of all chemical imports only, but to the effect of the liberalisation policy, which has resulted in a sudden increase in imports of such products as pharmaceuticals and also to the difficulty of raising home production in fast developing fields as quickly as the expansion of demand justifies.

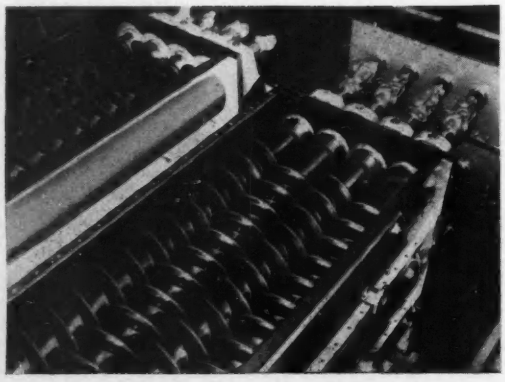
The official output index indicates an increase in chemical production in the Federal Republic by 11 per cent. German statistics distinguish between chemicals for production and for consumption; production of the former rose slightly faster than the latter last year. On a pre-war basis (1938=100) the output of chemicals for production last year stood at 240, that of chemicals for consumption at 171, and the index for all chemicals at 221. The index of chemical prices was 188 (calculated on the same basis), an insignificant advance over 1956. West German chemical producers are therefore justified in their claim that increasing costs have been offset by more efficient production and organisation methods. The substantial increase in exports no doubt helped to keep domestic prices down while larger imports of chemicals operated in the same direction.

Holmes to make Holo-Flite Heat Exchanger under licence

THE Turnbridge, Huddersfield, company of W. C. Holmes and Co. Ltd., are to manufacture and market under licence from Western Precipitation Corp. US, a new type of heat exchanger known as the 'Holo-Flite' processor. Designed as a screw conveyer with helical, hollow flights through which the heat transfer agent is circulated, it moves the material to be heated, cooled or dried, at a uniform, predetermined rate.

Heat is transferred to or from the material being processed by contact with the surfaces of the hollow flights and shaft and, since the principle of the conveyer is employed, the particles of the material within the mass are subjected to continuous movement by the helices and are constantly changing position. The rotating flights are mounted in troughs. The assembly of screws, trough, bearings and drive is the basic unit. Several units can be arranged horizontally, vertically or both to form a multi-unit. The overall length of a unit ranges from 15 to 33 feet. Standard construction for most applications is for two or more pairs of screws, known as synchro-screws. They are intermeshed and according to capacity, space limitations, and time of retention are grouped in multiples of two. Generally there are two of four screws in one unit.

The synchro-screws are made in varying diameters from 5 in. to 18 in. and in various metals; steel, stainless steel, Monel, aluminium, copper, bronze and other alloys. Particle size and degradation requirements govern the pitch of the flights, and replacement of screws with others of different pitch can be made to change heat exchange area. Screw speeds are usually between 1 and 20 r.p.m.



Hollow, intermeshing synchro-screws in the Holo-Flite processor which transport and heat or cool the material

Humphreys and Glasgow gain Dutch Gas Plant Order

A £50,000 CONTRACT has been awarded to Humphreys and Glasgow Ltd., to supply a 'labourless' carburetted water gas plant of 1¼ million cu. ft. daily capacity for the Haarlem Gas Undertaking, Holland. The plant will be designed for the reforming of refinery or natural gases and is to be completed ready for operation by November this year. The new plant is self-clinkering and is designed to recover steam from waste heat. Automatic controls enable the plant to be operated by a single man. A similar plant was installed at Haarlem by Humphreys and Glasgow in 1952.

It is stated that no additional labour will be needed when the new plant is installed, since both plants can be controlled by the same operator.

Humphreys and Glasgow have recently completed another carburetted water gas plant, also of 1¼ million cu. ft. capacity, at Delft, Holland.

Overseas News

DEMAND FOR SULPHUR REMAINED HIGH IN THE US IN 1957

DEMAND for sulphur declined slightly in 1957 but remained near the record high established the previous year. Consumption of sulphur in all forms in the US, according to preliminary estimates, was down about five percentage points from the record 5,780,000 tons consumed in 1956. Exports from the US were estimated to be near the 1956 high of 1,650,000 tons.

In an annual review Langbourne M. Williams, president of Freeport Sulphur Co., pointed out that the use of sulphur reflected the levelling off of business experienced by the major consuming industries such as steel, fertiliser, chemicals, paper, pigments, and rayon.

On the production front, the total output of sulphur from all US sources amounted to an estimated 6,900,000 tons, compared with 7,820,000 tons in 1956. Frasch sulphur alone accounted for 5,500,000 tons, down from the 1956 high of 6,425,000 tons. Of the remainder of the supply 525,000 tons represented elemental sulphur recovered from gases, 425,000 tons sulphur contained in pyrites, and 450,000 tons sulphur in other forms.

The bulk of the sulphur consumed by the nation was mined by the Frasch hot water process from deposits in Louisiana and Texas with some being imported from Mexico and the remainder being sulphur obtained in various forms from other sources.

As in the past years, approximately 80 per cent of the sulphur consumed was converted into sulphuric acid and the balance was used in elemental form or in other compounds.

Eleven US Frasch process mines were in operation throughout the year, and a twelfth, the Damon property of Standard Sulphur Co. in Texas, operated until April, when it was shut down. Texas Gulf Sulphur Co. remained the largest producer, followed by Freeport, Jefferson Lake Sulphur Co., and Duval Sulphur and Potash Co.

Three new US deposits are under development. The largest is Freeport's Grand Isle, a discovery of major magnitude located off the Louisiana coast in 45 feet of water six miles from the nearest land.

Du Pont Claim on Polythene

Following Du Pont's claim of sole patent right on linear polythene (CHEMICAL AGE, 28 December, p. 1042), Phillips Petroleum Co., US, are reported to be going ahead with patents on their process already licensed to several US companies. This company states that the Du Pont patent is based on the old high-pressure process which is entirely different from their own (Phillips') process. Doubting the validity of the Du Pont claims, Phillips reports that it uses a low-pressure process involving a catalyst developed by the company.

According to statements from Du Pont, the company intend to collect royalties from all companies making or planning to make the plastic even if already licensed by others.

Mexico Increases Sulphur Prices

Mexican sulphur producers—Pan-American Sulphur and Gulf Sulphur have increased their prices for sulphur by $1 a ton. This brings the price of filtered sulphur to $24 a ton, f.o.b. Mexican port. Gulf Sulphur have also increased the price of the unfiltered grade by the same amount—to $23 a ton. The companies state that the increase in the price of Mexican sulphur has been necessary to bring the market more in line with US sulphur.

Firestone's New Synthetic Rubber

Pilot plant production of a new synthetic rubber—Coral Rubber—will start early in 1958 at Firestone Tire and Rubber at Akron, Ohio, US. The company's annual report describes the new rubber as having characteristics so nearly identical to natural rubber that it may eliminate the need for costly stockpiling of natural rubber and ensure the US's complete independence of foreign sources in case of emergency.

ICIANZ'S Polythene Plant

With the start of the new £A2¼ million polythene plant of Imperial Chemical Industries of Australia and New Zealand, a new field in Australia's plastics industry has opened. Molasses from the Australian sugar industries provide the industrial alcohol as a basic raw material for polythene.

To enable the company to supply the growing Australian market, plans are already in hand to double the plant by a further investment of £A1 million. When in full production the plant will save about £A2 million a year in overseas expenditure.

Royal Dutch Require Fl.200 mil. for Synthetic Rubber Factory

According to a report in the Dutch *Financiel Dagblad*, the new synthetic rubber factory to be set up by Royal Dutch in Rotterdam will require an investment of fl.200 million (£20 million). It is proposed to produce 50,000 tons of synthetic rubber annually, of which a maximum of 13,000 tons will be consumed in Holland. The remainder (about 37,000 tons) valued at fl.70 million (£7 million) will be exported.

Salt Producer May Get Government Help

The South Australian Government may guarantee expenditure of £300,000 to extend the activities of Solar Salt Ltd. said Sir Thomas Playford, the Premier, recently, after inspecting progress on salt leases near Port Augusta. He said that a Parliamentary committee would enquire into the company's case for a Government guarantee to develop a large scale industry.

Solar Salt has opened negotiations to export 600,000 tons of salt to Japan. Bulkloading facilities costing £150,000 would be needed and another £150,000 would be spent in extending the working area.

The export potential of the company is said to be £1 million a year and the annual output 500,000 tons.

Expansion Plans by the Linde Co.

For the first time since the end of World War II the US nation's oxygen production will exceed industry's immediate demands, according to Mr. W. M. Haile, president of the Linde Co., a division of Union Carbide Corp. On 1 January Linde's newly-expanded liquid oxygen plants in Ashtabula, Ohio, and Fontana, California, will go on stream to deliver an added monthly output of 150 million cubic feet of oxygen.

To meet future conditions Linde plan to expand further their Fontana output by some 430 tons of oxygen gas in mid-1958. In 1959 additional facilities at Fontana will add 115 million cubic feet to monthly production.

New Synergist for Pyrethrins

A new synergist for pyrethrins and related insecticides has been reported by Dr. Morton Beroza, of the US Department of Agriculture, Beltsville, Maryland, US. Known as Sesoxane, it has the chemical name 2-(3, 4-methylene-dioxyphenoxy)-3, 6, 9-trioxaundecane.

It is claimed to be superior in use to other commercial synergists and to cost less. Manufacturers are Shulton Inc., Fine Chemicals Division, 45 Rockefeller Plaza, New York 20, NY, US.

Holland to make Polythene

Towards the end of 1958, the Netherlands State Mines organisation will take up the large-scale production of polythene to be marketed under the name of Stamylan. The State Mines have for some time been manufacturing this material in a pilot plant according to the low-pressure (Ziegler) process but it is reported that the ICI high-pressure process will be used in the new plant, which will have an annual capacity of 7,000 tons. The manufacture of polythene will considerably extend the range of chemical base materials and end products already produced by the State Mines.

Temporary Relief for Sulphur Industry

The Bank of Sicily has acceded to the request made by the local authorities in Palermo and agreed to prolong credits in favour of the local sulphur mines. This temporary relief will help the owners of mines to continue paying their workmen.

Hibernia Subsidiary's Polythene Plant

A polythene plant using the Ziegler low-pressure process is to be erected by Scholven-Chemie AG, Gelsenkirchen-

Buer. The first section of the plant will have an output capacity of 6,000 metric tons and go on stream at the end of this year. Ethylene will be obtained from Scholven's parent company, Hibernia, who have operated a small pilot plant for polythene at Gladbeck-Zweckel for some time. By next autumn, Scholven-Chemie AG are to extend the throughput capacity of their oil distillation plant from 2,200,000 to 2,400,000 tons a year.

Callery's New Rocket Fuel

A new, solid rocket fuel, based on a boron-carbon-hydrogen compound, is being developed by Callery Chemical. Although called HiCal, Callery's name for its liquid fuel, it is a new compound. It is now in the pilot plant stage, but it is announced that enough will be available for testing within a year.

It is reported that Callery may also carry out research on oxidisers and other propellant components.

Petroleum Refineries in Italy

Capacity of the petroleum refinery operated by Rasion at Augusta, Sicily, will be expanded to 5.5 million tons a year and that of the refinery planned at Milazzo by Societa' Mediterranea Raffineria Siciliana will total 2.6 million tons a year. Two more refineries are planned for Sicily and it is claimed that this will bring total Sicilian refining potential to 10 million tons a year.

Expansion of Pernis Plant

The refinery owned by the Caltex Petroleum Mij. NV, at Pernis near Rotterdam, is to be expanded so as to have a capacity of 5.5 million tons of petroleum p.a., i.e. more than twice the present capacity. Extensions comprise the construction of a second crude oil distillation plant and of a second platformer for the manufacture of low-sulphur fuel (platinum gasoline). In addition, storage capacities for both crude and refined products will be increased, workshops and jetties will be enlarged, etc. This expansion project, which is to be completed in 1960, will require an investment of fl.120 million (£12 million).

Changes in Australian Import Duty

The Australian department of customs and excise has freed from import duty under the British preferential tariff the following chemicals: benzenehexachloride, lindane grade (99.9-100 per cent gamma isomer); methylpiperazinopropyl chlorophenothiazine; nor-androstenolone phenyl propionate; oleandomycin; and potassium carbonate.

Israel's Research on Desalinisation of Sea Water

Research is being carried out by the Research Council of Israel on the desalinisation of sea water and purification of brackish underground water resources. Two lines of research are currently being followed.

The first scheme involves the freezing of sea water according to a process developed by A. Zarchim. A pilot plant is now under construction and definite results are hoped for within six months.

The second project under investigation is the electro-dialysis of brackish well water. Production of filtering membranes at an economic price are now possible, and the laboratory tests are to be scaled up. A pilot plant is to be constructed at Beersheba.

Buna-Werke Raises Capital

Buna-Werke Hüls GmbH, the company formed jointly by Chemische Werke Hüls and a syndicate established by BASF, Hoechst and Bayer for this purpose, have raised their ordinary capital from the nominal sum of DM 120,000 to DM 42,000,000 (£10,000 to £3,810,000). The company is now erecting plant for the production of synthetic rubber.

SA Bureau of Standards Opens New Laboratory

A laboratory to carry out tests for the heavy and chemical engineering industries on the East Rand and in the Orange Free State goldfields and Vereeniging areas has been opened in Vereeniging by the South African Bureau of Standards. The laboratory is equipped with modern, non-destructive testing equipment, and possesses a complete set of British and South African standard specifications, which will be available to industry.

Eurochimie to make plutonium

In Paris on 20 December, twelve European countries agreed to form the first joint European commercial undertaking to produce plutonium—to be known as Eurochimie. Capital will be $20 million (£7.14 million) and the sponsor is the Organisation for European Co-operation. West Germany is Eurochimie's largest single shareholder holding 68 of the company's 400 shares each worth $50,000. Other holders are the Governments or atomic energy commissions of Austria, Belgium, Denmark, France, Netherlands, Norway, Portugal, Sweden, Switzerland, Italy and Turkey.

The plan to set up this commercial undertaking and produce plutonium follows a recommendation of an OEEC committee early in 1957.

Sodium Carbonate Factory

A new company, Cia. Elaboradora de Productos Nitrogenados y Sodicos SA, has been formed in Chile to manufacture sodium carbonate and related products.

Acid Transport by Ship

The transport of nitric and acetic acids between Höchst-on-Main and the Lower Rhine is now carried out by ship. A new vessel, the Friedrich Stolz, carries acetic acid from Knapsack near Cologne to Farbwerke Höchst and nitric acid from Höchst to Uerdingen.

Oxygen and Fuel Plants for Dominica

An oxygen plant has been built at Ciudad Trujillo, Dominican Republic, to produce 600 cubic metres of oxygen daily, together with 300 cubic metres of acetylene. A salt refinery has been opened, also at Ciudad Trujillo, to produce iodised salt for domestic use, using salt produced in the mines at Barahona. It is claimed to be capable of satisfying the entire home market.

Nitrate Figures Down But Iodine Increase

During the first five months of 1957, 553,341 tons of nitrate were produced in Chile, eight per cent less than during the equivalent period in 1956. In the same period, 555 tons of iodine were produced, an increase of 71 per cent over 1956.

New Amine Synthesised for Study as Liquid Rocket Fuel

SYNTHESIS procedures and properties of a new aliphatic amine for possible use as a liquid rocket fuel are described in a report of Air Force research just released to industry through the Office of Technical Services, US Department of Commerce, Washington 25 DC. Variation of light intensity of rocket motor flames is studied in another volume also available through OTS.

R. W. Moshier and L. Spialter, Wright Air Development Centre, US Air Force (order PB 121684, 50 cents) report aliphatic amines, particularly the tertiary amines, have exhibited promising properties for use as liquid rocket fuels. It is stated that their favourable combustion characteristics, compared to standard hydrocarbon fuels, are shorter ignition delay times and smoother, more controllable burning rates. They also have low freezing points, good vapour pressures, and satisfactory chemical stability and chemical purity. This report describes the preparation of a new compound, N,N,N′,N′-tetramethyl-1,2-propanediamine. The material was synthesised by the Eschweiler-Clarke procedure in 76 per cent yield. It was found to be a clear, colourless liquid with a very strong amine odor. The compound was completely miscible with water and organic solvents. Its boiling point was 138° to 139°C, mobile fluid minus 100°C, and dielectric constant 2.4. The material was characterised by preparing the compounds dihydrochloride, monopicrate, di(methiodide), and the di(methyl-p-toluenesulphonate).

A study on 'Rocket motor flame light intensity versus time', by R. G. Cumings, N. W. Guinard, and F. E. Boyd, Naval Research Laboratory, (Order PB 131037, 50 cents) states that among the variable characteristics of rocket motor flames is light intensity. Such factors as motor design and type of fuel and oxidiser used could affect the light radiation characteristic. This study dealt with the light intensity characteristic and its variation with time observed for a number of motors operating on different fuels and mixture ratios. Fuels used included Solox (alcohol and water), methanol, ethanol, gasoline, ammonia, turpentine, and mono-ethyl-aniline. Analysis of frequency spectra of rocket motor firings showed that liquid oxygen combinations fell into similar patterns, while acid/fuel combinations were without pattern.

PEOPLE in the news

● DR. H. E. NORTH, Billingham division distribution manager, is to be production manager of the new heavy chemicals division of Imperial Chemical Industries. MR. J. A. LOFTHOUSE, at present oil works engineer, is to be the engineering manager. Other appointments are: DR. K. W. GEE, olefine works manager; DR. D. W. HUEBNER, technical department manager; DR. D. G. JONES, research manager; MR. M. A. HODGSON, technical service and development manager; MR. F. WITT, techno-commercial manager; and MR. E. P. STREET, sales control manager. Dr. North has been distribution manager since January 1956. He started at Billingham in 1934 as a chemist, becoming Moss-end works manager in 1946, and Prudhoe works manager in 1949. In 1953 he returned to Billingham as division work study manager.

● MR. RALPH D. PARKER, vice-president in charge of Canadian operations of the International Nickel Co. of Canada, is to move his headquarters to the now expanded offices in Toronto shortly. MR. RALPH H. WADDINGTON, MR. JAMES C. PARLEE, MR. RICHARD A. CABELL and MR. PAUL QUENEAU have been appointed as assistant vice-presidents of the International Nickel Co. of Canada. Mr. Waddington has also been appointed general manager of the parent company's Ontario division, and Mr. Parlee general manager of the Manitoba division. Mr. Cabell and Mr. Queneau have also been elected vice-presidents of the International Nickel Co. Inc., the US subsidiary.

Mr. R. A. Sawtell, who has been made distribution manager of the chemicals division of the Distillers Company. He was formerly transport manager of the yeast division

● MR. J. T. HOOK, commercial manager of Roussel Laboratories Ltd., left London on 29 December by air for a 7,500-mile business tour of West Africa and Ghana to stimulate British pharmaceutical export business. He will be visiting Kano, Jos, Enugu, Aba, Port Harcourt, Lagos, Ibadan, Accra, Kumasi and Takoradi. A series of meetings with leading members of the pharmaceutical world in West Africa has been arranged.

● MR. J. CAMPBELL MACDONALD, chief technical officer, and MR. G. C. ASH, secretary, have been appointed directors of the British Sugar Corporation. Mr. Macdonald, who was appointed as chief technical officer in 1948, will continue in that capacity in addition to his duties as director. Mr. Ash, who has been secretary since 1946, will also retain that office.

● DR. JOHN C. BAILAR JR., professor of inorganic chemistry, University of Illinois, has been chosen president-elect of the American Chemical Society. He will head the Society in 1959. President for 1958 will be DR. CLIFFORD F. RASSWEILER, vice-chairman of the board and vice-president for research and development of the Johns-Manville Corp., New York, who takes office on 1 January, succeeding PROFESSOR ROGER J. WILLIAMS of the University of Texas.

● English directors of the newly formed Pulverizing Machinery Ltd., Parnall Road, Fishponds, Bristol, are MR. W. WALKER, chairman, and MR. R. W. YOUNG. In addition the board will include two US directors whose names have not yet been announced.

● DR. B. D. THOMAS, scientist and research administrator, has been appointed president of the Battelle Memorial Institute, Columbus, Ohio, to succeed DR. CLYDE WILLIAMS who is to retire. Dr. Thomas joined the Battelle organisation as a research engineer in 1934, was appointed assistant director in 1942, and vice-president in July 1955. He established and headed the Institute's first division of chemical research in 1939, and was a key figure in the establishment of Battelle's research laboratories in Frankfurt and Geneva.

● MR. M. COMPTON, an assistant secretary in the Ministry of Agriculture, Fisheries and Food has been appointed a member of the food standards committee in place of MR. A. PROPPER.

● Managing director of High Duty Alloys Ltd., MR. H. G. HERRINGTON, has been re-appointed chairman of the Aluminium Industry Council.

● A director of the board of Unilever Ltd., MR. J. L. HEYWORTH has retired on reaching retirement age. He joined the company in 1910 and has been on the board since 1938.

● MR. S. H. A. HIRSCH and MR. C. N. FORD have been appointed to the board of Vinyl Products, a subsidiary of Reichhold Chemicals.

● The appointments of MR. ALBERT P. GAGNEBIN and MR. L. E. GRUBB as assistant vice-presidents of the International Nickel Co. Inc. are announced.

● MR. P. BAINES, previously company secretary, has been appointed a director of Marchon Products Ltd., and of its associated companies, Solway Chemicals Ltd., and Astoria Shipping and Transport Co. Ltd. His duties will be primarily administrative and will include purchasing. He will continue to be secretary to the three companies.

New general manager of Peter Brotherhood with effect from 1 January is Mr. S. J. Bellamy, who succeeds Mr. A. Marcus Neal. Mr. Neal remains as chairman of the company

● MR. W. T. VIZER-HARMER, at present director and commercial manager of Steel, Peech and Tozer (branch of The United Steel Cos. Ltd.), has been appointed commercial director of the branch as from 1 January. He will be succeeded as commercial manager by MR. J. MACKENZIE-MAIR who will be responsible for all commercial and sales matters.

● MR. J. L. HARRISON has been appointed technical sales manager of Davy British Oxygen Ltd., and MR. K. T. BRIGHTMAN has been appointed assistant technical sales manager. Mr. Harrison was formerly employed by British Oxygen Gases Ltd. as technical adviser on iron and steel processes, and Mr. Brightman acted as his assistant in this capacity. The services of both men will still be available to British Oxygen Gases Ltd. for advice on the metallurgical uses of oxygen in the manufacture of iron and steel.

Obituary

Dr. Arthur Ewins, formerly director of research of May and Baker Ltd., died on 24 December at the age of 75. He was perhaps best known for his work on the discovery of M and B 693, the famous sulphapyridine drug for pneumonia.

Dr. Ewins was the son of a railwayman and graduated at London University after evening studies at Chelsea Polytechnic, working at the Wellcome Laboratories, Herne Hill, during the day. In 1914 he became a member of the staff of the Medical Research Committee (War Council) under Sir Henry Dale, and in that year published his first paper. There he was engaged in work connected with the production by British firms of German drugs cut off by the war, in particular of salvarsan. In 1917 he joined May and Baker and later became head of their chemical research department, where he was largely responsible for the development of the chemotherapeutic programme, which resulted in the introduction of stilbamidine and pentamidine.

In 1937, working with his colleague Dr. M. A. Phillips in the May and Baker laboratories, and with the late Sir Lional Whitby of the Middlesex Hospital, he discovered the first of the important sulphonamide derivatives, sulphapyridine, which had great value in the treatment of pneumonia. This drug became known as M and B 693.

UK Chemical Exports/Imports January-November 1957

EXPORTS

		QUANTITY		VALUE	
		Jan./Nov. 1956	Jan./Nov. 1957	Jan./Nov. 1956	Jan./Nov. 1957
INORGANIC				£	£
Acids	Cwt.	177,810	194,593	594,613	639,358
Copper sulphate	Tons	44,775	27,334	4,624,341	2,384,258
Sodium hydroxide	Cwt.	5,000,258	3,907,867	6,347,937	4,951,976
Sodium carbonate	,,	4,412,937	4,056,271	2,748,616	2,774,443
Aluminium oxide	Tons	22,794	28,933	744,925	1,009,357
Aluminium sulphate	,,	39,718	31,667	567,665	448,055
Other aluminium cpds.	,,	3,407	3,622	157,656	148,867
Ammonia	Cwt.	85,583	73,697	319,634	287,222
Ammonium cpds. (not fertilisers or bromide)	Tons	21,686	17,391	817,490	673,513
Arsenical compounds	,,	4,098	3,606	320,601	257,365
Bismuth compounds	Lb.	293,351	348,587	248,802	286,341
Bleaching powder (chloride of lime)	Cwt.	334,042	220,546	549,851	382,314
Hydrosulphite	,,	72,246	78,557	572,953	617,974
Other bleaching materials	,,	103,965	131,597	469,865	616,215
Calcium compounds	,,	316,516	328,091	639,253	654,755
Carbon blacks	,,	431,434	710,590	1,506,376	2,599,224
Cobalt compounds	,,	11,917	15,228	541,667	531,092
Iron oxides (chemically manufactured)	,,	86,689	90,181	275,929	274,559
Lead compounds	,,	46,232	52,685	310,538	314,306
Magnesium compounds (nes)	Tons	12,668	16,898	656,208	823,716
Nickel salts	Cwt.	73,091	74,928	704,086	823,957
Potassium compounds (not fertilisers or bromides)	,,	51,305	56,592	505,334	558,079
Sodium bicarbonate	,,	679,941	665,836	606,288	611,884
Sodium phosphates	,,	74,751	120,229	343,937	554,904
Sodium silicate (water glass)	,,	378,587	301,420	335,182	272,202
Other sodium cpds.	,,	1,597,730	1,642,895	3,494,026	3,683,988
Tin oxide	,,	6,980	7,977	255,767	288,256
Zinc oxide	Tons	5,348	6,528	428,470	461,387
Inorganic chemicals (nes)		—	—	4,307,954	4,400,217
ORGANIC					
Acids, anhydrides and their salts and esters		—	—	1,238,266	1,223,958
Glycerine	Cwt.	57,595	95,837	611,473	882,192
Ethyl alcohol, etc., and mixtures of alcohols (nes)		—	—	1,259,292	1,457,690
Acetone	Cwt.	180,457	113,161	464,109	359,026
Citric acid	,,	37,032	46,305	364,585	457,074
Gases, compressed, liquid or solid (nes)		—	—	868,626	2,125,036
Phenol	Cwt.	80,619	126,314	517,552	808,627
Salicylates	Lb.	882,030	949,295	222,735	265,210
Sodium compounds	Cwt.	24,896	27,458	288,487	369,128
Sulphonamides not prepared	Lb.	1,562,503	1,410,516	828,588	1,059,329
Dyestuffs intermediates (nes)	Cwt.	79,984	92,462	1,245,829	1,299,187
Organic compounds (nes)		—	—	12,707,274	15,174,984
Total for elements & cpds.		—	—	**54,612,780**	**57,811,215**
Coal tar	Tons	108,687	83,840	1,015,286	911,118
Cresylic acid	Gall.	3,471,774	2,693,567	1,126,189	987,641
Benzol	,,	1,232,688	19,640	204,142	8,166
Creosote oil	,,	22,622,081	17,303,933	1,467,005	1,197,405
Other mineral tars and crude chemicals	Cwt.	229,794	181,310	534,387	409,557
Pigment dyestuffs	,,	22,202	26,941	900,783	1,081,202
Other synthetic dyestuffs	,,	171,755	175,339	7,798,258	8,495,312
Synthetic organic pigments	,,	21,471	23,889	747,578	926,671
Vegetable and animal dyeing extracts	,,	4,294	3,185	124,275	118,982
Tanning extracts (solid or liquid)	,,	98,154	112,637	440,315	500,773
Synthetic tanning materials	,,	67,690	73,038	241,182	278,172
Pigments, paints, varnishes, etc.		—	—	21,700,055	22,224,174
Drugs, medicines, etc.		—	—	32,914,270	36,442,237
Explosives		—	—	10,089,389	9,757,671
Insecticides, fungicides and rodenticides	Cwt.	332,349	316,107	3,869,200	3,937,539
Weedkillers	,,	80,940	85,515	942,105	939,208
Carbons, decolorising or activated	,,	83,449	74,048	353,220	313,946
Tetra-ethyl lead anti-knock compound	Gall.	4,444,771	4,939,792	9,571,856	10,767,797
FERTILISERS					
Ammonium nitrate	Tons	3,778	2,148	122,246	70,668
Ammonium sulphate	,,	23,794	162,564	461,236	2,802,171
Phosphatic and potassic		—	—	59,957	57,754
Other fertilisers		—	—	360,813	325,759
PLASTICS MATERIALS					
Phenol and cresol formaldehyde resins	Cwt.	57,936	66,528	411,216	459,783
Urea formaldehyde resins	,,	249,032	204,914	1,193,176	1,027,699
Vinyl resins, unplasticised	,,	145,624	192,374	1,409,850	1,677,418
Vinyl resins, plasticised	,,	98,616	133,778	1,264,902	1,588,213
Other vinyl resins	,,	170,341	198,264	2,163,304	2,526,988
Moulding materials	,,	725,026	857,080	9,426,146	10,138,466
Sheet, rod, tube, film and foil	,,	249,787	276,956	7,599,608	8,287,506
MISCELLANEOUS					
Photographic chemicals (nes)	Cwt.	31,317	37,489	552,639	637,988
Scientific glassware	,,	16,297	13,732	765,219	753,923
Chemical and gas machinery	,,	110,966	148,099	2,024,962	3,280,923

IMPORTS

		QUANTITY		VALUE	
		Jan./Nov. 1956	Jan./Nov. 1957	Jan./Nov. 1956	Jan./Nov. 1957
INORGANIC				£	£
Acids	Cwt.	57,537	55,722	169,899	171,970
Aluminium oxide—Crude, unground	Tons	20,240	17,256	1,055,493	940,394
Ground or graded	,,	2,851	2,893	300,692	309,011
Silicon carbide	,,	11,089	8,378	1,134,266	853,840
Arsenic trioxide	,,	5,251	3,039	181,931	90,115
Borax, refined	Cwt.	441,306	468,740	839,379	927,335
Calcium carbide	,,	955,158	1,155,942	1,766,240	2,220,077
Carbon black channel	,,	157,808	167,360	875,098	962,278
Other carbon blacks	,,	84,033	77,912	320,884	297,846
Cobalt oxides	,,	11,222	6,971	702,098	435,979
Iodine	Lb.	461,879	912,053	230,560	352,021
Mercury	,,	1,429,281	1,323,251	1,564,305	1,473,939
Sodium, calcium, potassium, lithium	Cwt.	68,058	24,041	985,393	198,502
Potassium carbonate	,,	75,590	93,285	245,679	305,713
Other potassium cpds. (not fertilisers)	,,	67,134	89,776	314,218	408,596
Selenium	Lb.	182,338	127,325	1,089,284	628,272
Silicon	Tons	5,610	5,024	846,444	839,661
Sodium chlorate	Cwt.	91,098	106,888	278,712	359,295
Sodium phosphate	,,	20,063	4,139	90,542	28,045
Other sodium cpds.	,,	268,546	315,487	1,029,880	1,161,889
Inorganic chemicals (nes)		—	—	2,540,302	2,730,582
ORGANIC & OTHERS					
Acids, anhydrides and their salts and esters		—	—	1,792,933	2,612,503
Glycerine	Cwt.	95,769	103,560	718,600	636,924
Menthol	Lb.	85,803	146,466	174,880	297,717
Naphtha, methyl alcohol and alcohols and alcohols mixture (nes)		—	—	2,433,293	3,298,091
Turpentine	Gall.	725,242	712,931	185,225	188,631
Glycol ethers and esters	Lb.	6,138,509	6,729,982	527,701	589,818
Sodium compounds	Cwt.	102,677	123,990	1,027,247	1,322,562
Styrene	Gall.	3,339,492	1,150,450	1,817,224	587,022
Vinyl acetate	Tons	9,080	4,815	1,311,749	560,909
Dyestuffs intermediates	Cwt.	8,082	27,130	480,470	927,753
Organic compounds (nes)		—	—	10,938,681	11,064,757
Synthetic organic dyestuffs and compounds	Cwt.	33,186	33,657	2,525,829	3,122,418
Titanium dioxide	,,	60,872	105,492	658,023	1,006,151
Other pigments	,,	161,591	210,840	582,918	661,440
Vitamins		—	—	1,357,734	1,031,204
Antibiotics		—	—	654,980	1,195,365
Alkaloids		—	—	865,174	584,364
FERTILISERS					
Basic slag	Tons	78,161	89,706	629,862	734,749
Potassium chloride	Cwt.	10,106,396	9,714,905	8,272,130	8,066,915
Potassium sulphate	,,	219,863	286,695	221,692	281,714
Other fertilisers		—	—	1,280,098	1,660,459
Explosives	Cwt.	5,542	10,000	211,746	213,824
PLASTICS MATERIALS					
Vinyl resins	Cwt.	113,413	158,910	1,612,739	1,999,184
Other synthetic resins	,,	180,822	249,853	2,742,516	3,443,193
Polystyrene	,,	4,842	14,050	59,157	172,502
Other moulding powders	,,	23,362	57,740	415,326	1,196,132
Sheet, rod, tube, film and foil	,,	72,683	93,587	3,022,809	3,766,065
MISCELLANEOUS					
Chemicals and chemical materials and products (nes)		—	—	4,564,870	5,272,665
Chemical and gas machinery	Cwt.	20,416	33,019	896,893	1,341,307

EXPORTS OF ALL CHEMICALS TO PRINCIPAL MARKETS

	Jan./Nov. 1955	Jan./Nov. 1956	Jan./Nov. 1957
Gold Coast	3,763,713	4,168,572	4,701,504
Nigeria	4,854,977	4,996,430	4,838,184
Union of South Africa	10,622,251	10,890,259	11,772,063
Rhodesia and Nyasaland	2,145,937	2,161,531	2,642,832
India	15,005,211	17,330,832	15,707,034
Pakistan	4,178,071	3,753,220	3,377,091
Singapore	3,685,155	4,348,674	3,774,192
Federation of Malaya	3,264,300	3,450,077	3,585,613
Ceylon	2,517,401	2,214,140	3,184,545
Hong Kong	2,893,447	3,311,046	4,029,830
Australia	17,586,248	16,361,811	20,001,627
New Zealand	7,313,270	6,682,435	7,907,073
Irish Republic	6,199,879	6,122,953	6,117,487
Finland	2,958,580	2,945,695	2,574,649
Sweden	5,567,712	5,942,807	6,708,384
Norway	3,108,234	3,300,285	3,799,698
Denmark	3,631,818	4,116,240	4,398,878
Western Germany	5,140,304	5,800,804	7,914,989
Netherlands	7,108,693	8,125,537	9,232,937
Belgium	4,860,150	5,521,029	6,096,330
France	6,158,871	6,930,959	7,975,775
Switzerland	2,306,912	2,867,265	2,957,916
Portugal	1,636,391	2,026,345	2,405,342
Italy	5,707,959	8,126,519	8,075,794
Netherlands Antilles	2,534,045	2,496,835	2,865,017
Iraq	2,096,997	2,222,744	2,545,077
Iran	1,861,882	1,823,501	3,118,191
Burma	2,492,768	2,779,813	3,979,576
Japan	1,131,780	2,027,412	2,171,307
United States of America	6,963,796	8,016,341	6,791,444
Brazil	200,160	2,212,803	2,548,220
Argentine Reublic	4,355,633	2,993,919	5,058,965
Other foreign countries	2,456,388	3,073,276	3,874,119
Total for all Countries	**213,431,328**	**225,097,268**	**245,580,537**

Commercial News

Murex Seek Treasury Consent To Raise £1.3 Million

THE interim statement from Murex Ltd., informs shareholders that in order to be assured of the availability of the necessary funds to meet their capital programme, application has been made for Treasury consent to raise not more than £1.3 million by an issue of unsecured loan stock. The company state that the issue price and terms have to be agreed with the CIC. Stockholders will be informed of developments but no action is anticipated before next autumn.

In this interim report, the chairman, Sir Arthur Smout, declares an unchanged interim dividend of 7½ per cent on account of the year ending 30 April 1958. For 1956–57 the total dividend was brought up to 20 per cent with a 12½ per cent final.

Mention is made of the continued fall in the world price of wolfram. Further stock losses 'of a fortuitous character' will be sustained in the current financial year, although these are considered likely to be of a lesser degree than those in 1956–57. If the need arises, recourse will be had to the stock contingency reserve created for this purpose. However, during the last six months, in spite of difficult trading conditions, group trading results to 31 October 1957 are stated to be at the same overall level as those for the corresponding period of 1956.

Other points mentioned in the report are that supplies of molybdenite and vanadium raw materials are now sufficient to meet current demands for these materials. Demand for welding electrodes and for plant and equipment has continued to be satisfactory.

Erinoid

Acceptances have been received in respect of 52.4 per cent of ordinary and 85.5 per cent of preference shares in response to O. and M. Kleemann's offer for Erinoid's issued capital (see last week's CHEMICAL AGE), report Singer and Friedlander. With stock already purchased, Kleemann's have approximately 74 per cent of the total votes of Erinoid.

Greeff-Chemicals

Acceptance of 193,966 of the 200,000 5s ordinary shares provisionally allotted to the ordinary stockholders registered on 4 November is announced by the directors of Greeff-Chemicals Holdings. This has left 6,034 shares to meet applications for excess shares totalling 266,890.

It is stated that those who applied for up to and including 40 shares have received allotment in full. A ballot has been held for the remaining shares in parcels of 40 shares.

Head Wrightson

As forecast the interim ordinary dividend of Head, Wrightson and Co., general engineers, on the £1,771,875 ordinary shares, as increased by a 50 per cent scrip issue in respect of the year ending 31 January 1958 is 5 per cent. The final payment for 1956–57 was equivalent to 10 per cent on the present capital.

Redfearn Bros.

The directors of Redfearn Brothers Ltd., announce a one-for-one scrip issue subject to CIC consent. It is proposed to capitalise £294,800 of undivided profits in a scrip issue of 1,179,200 5s ordinary shares.

Vitamins Ltd.

Vitamins Ltd. have announced that in view of the heavy oversubscription of the offer of 520,000 ordinary 5s shares at 10s each the basis of allotment in respect of applications for the shares will be as follows: Up to 30 shares, in full; 31 to 3,999, 30; 4,000 and over, by ballot for allotments of 200 shares. Letters have been posted.

Rubber Regenerating Co.

Total value of turnover of the Rubber Regenerating Co. Ltd., was 13 per cent higher in 1957 than in the previous year. This was largely due to a greater volume of reclaimed rubber exported and to higher sales of Naugatuch Chemicals and Paracril Synthetic Rubber. Exports accounted for 44½ per cent of the company's total sales. However, in spite of the greater volume of production, a rise in the output per man hour, increased efficiency in the usage of coal and electricity, overall costs rose steadily throughout the year and profit margins fell in consequence. The chemical plant is operating with greater efficiency it is stated, but competition from new products is constantly being met. Output of the chemical plant was very similar to that of 1956, but operating expenses, in particular repairs and maintenance, have had an adverse effect on the profit from this part of the company's operations.

The extension to the rubber reclaim plant now reaching completion is expected to add over 25 per cent to the company's reclaim capacity. Cost is estimated at £370,000. The current programme includes enlargement of the company's activities in rubber chemicals and further progress in automatic handling equipment. Over the past two years some £520,000 has been spent on these developments and the present plan envisages outlay of a further £135,000.

Trading profit before taxation was £486,013 as compared with £472,352 in 1956. Write-off in respect of obsolescent plant was £11,555 less than the 1956 figure. Transfer of £170,000 has been proposed by the directors who also recommend a final dividend of 10 per cent, making 15 per cent for the year.

Colliery Explosives

Imperial Chemical Industries Ltd. have announced that, consequent upon an approach from the directors of the Colliery Explosives Co. of Newton-le-Willows, Lancs, they are acquiring the issued share capital (consisting of 108,000 £1 shares) of that company.

NEW COMPANIES

BERKELEY LABORATORIES LTD. Cap. £1,000. Manufacturers of and dealers in cosmetics, lotions and toilette and beauty preparations, etc. Directors: D. Barkaway and M. Lee. Reg. office: 66/7 Newman Street, London W1.

ENGINEERING AND SCIENTIFIC EQUIPMENT LTD. Cap. £1,000. Manufacturers of precision and scientific instruments, etc. Directors: W. Henshaw, G. R. Sale and S. Henshaw. Reg. office: 14 Howick Place, London SW1.

ICI (HEAVY ORGANIC CHEMICALS) LTD. Cap. £100. Manufacturers, producers, merchants and dealers in chemicals of all kinds, based on crude petroleum and on fractions or products derived from crude petroleum. Imperial Chemical Industries Ltd., Millbank, London SW1, shall be sole director and manager of the company.

Market Reports

RENEWED ACTIVITY EXPECTED

LONDON The usual end of the year conditions have prevailed on the industrial chemicals market with the undertone continuing firm. While a good volume of contract replacement business has been put through spot demand is quiet, but renewed activity on a widening scale is expected as the New Year gets under way.

Fluctuations in the prices of the non-ferrous metal compounds have been the only notable changes in recent weeks and present indications are for quotations to remain steady.

Pitch is receiving an active enquiry on a steady coal-tar products market, and it is understood that much of the contract renewal business has been completed.

MANCHESTER Trading during the past week has not yet got back to pre-holiday conditions, but an early recovery is looked for. Contract deliveries of the alkalis and other bread-and-butter lines during the past few days have been on a fair scale, but fewer enquiries and less actual new business have been in the market. The movement on shipping account has been on quietly steady lines. Prices generally are well maintained. The demand for fertiliser materials and for tar products has been moderately active.

GLASGOW As was expected, business generally was fairly quiet during the past week in the Scottish heavy chemical market due to the approaching New Year holidays. There was, however, quite a volume of enquiries received for forward requirements, which may be a favourable pointer for the coming year. Prices generally have remained unchanged.

PROFESSOR DENBIGH DISCUSSES GAS-SOLID REACTIONS

THE chemical engineer was concerned with rate-limiting processes of reactions such as the combustion of solid fuel and the reduction of ores on a large scale where the temperature was controlled by reaction rates, by diffusion of gases and by heat transfer. This was said by Professor K. G. Denbigh at a meeting of the North Western Branch of the Institution of Chemical Engineers in a paper, 'Gas-solid reactions'.

When a sphere of carbon was burned below 850°C in oxygen-nitrogen mixtures, Hottel found the rate of combustion was controlled by the chemical reaction at the solid-gas interface; above 850°C a much decreased temperature coefficient for the reaction, which was of the order to be expected from theories of diffusion, proved that diffusion of the gas to the gas-carbon interface controlled the rate.

Oxidation of rectangular zinc sulphide crystals to zinc oxide by air was studied. A porous layer of zinc oxide formed on the surfaces of the crystals permitted the diffusion of sulphur dioxide from the surface and provided the main diffusional resistance. The control of the rate of oxidation of the sulphide changed from chemical to diffusional above about 830°C. At temperatures above 950°C the reaction rate changed again because the evaporation and dissociation of zinc sulphide took control and oxidation in the vapour phase followed.

It was quite possible that diffusion again controlled the rate of oxidation at still higher temperatures, the oxidation being similar to that of flaming oil droplets in air. Professor Denbigh plotted the rate of heat loss by convection from a solid on the same graph as the reaction rate versus temperature; the loss was proportional to the temperature difference between solid and gas, it was a straight line law and under suitable conditions could cut the reaction rate curve for zinc sulphide or carbon oxidations at three temperatures.

The lowest and highest temperatures of intersection were stable because any sudden rise or fall in the temperature of the solid will cause greater or less heat loss and there will be a return to the former conditions. The intermediate temperature of intersection was unstable because any decrease in temperature would cause the system to revert to the lowest temperature of intersection and any increase in temperature of the solid would continue until the highest temperature of intersection was reached. The lowest temperature of intersection was the ignition temperature and had no absolute significance.

Bradford Xmas Science Lectures

The Christmas science lectures for schoolchildren, under the auspices of the Bradford Civic Society, were given in St. George's Hall, Bradford, on 31 December and 1 January. The subjects were 'The magic of plastics' and 'Artificial fibres', both lectures having been organised by ICI Ltd. They were given by Mr. T. C. Corbett, plastics division, and Mr. J. R. Whinfield, director of fibres division.

Fire Resistant Hydraulic Fluids

DETAILS of fire resistant water-base hydraulic fluids are contained in an 'Industrial Technical Bulletin' published by Mobil Oil Co. Ltd., Caxton House, London SW1. Known as Mobil Nyvac 20 and 30, these two fluids, of different viscosities, will, it is claimed, meet the requirements of most hydraulic systems.

Both these fluids have been tested for their fire-resistant properties. For example, it was found that Nyvac 20 could not be ignited when atomised by a diesel injection nozzle at 3,000 p.s.i. A petroleum hydraulic fluid was ignited by a small gas flame under the same conditions with explosive violence.

Premier Colloid Open New Lab

Premier Colloid Mills Ltd. and their Northern agents, O. O. Robinson [Leeds] Ltd., have opened a new laboratory at Glebe House, Hollin Lane, Leeds 16. It is at the disposal of all firms wishing to test their own materials on PCM machines. Shown at the opening are, l. to r., Mr. Prentice, Mr. E. Sutton, Mr. O. O. Robinson, Captain J. F. E. China, chairman and managing director of Premier Colloid Mills, Mr. L. P. China, sales director, Mr. J. Mulvaney and Mr. N. Carter.

FOR YOUR DIARY

WEDNESDAY 8 JANUARY

Plastics Institute—Cardiff; Angel Hotel. 7 p.m. 'New developments in unsaturated polyester resins' by H. Williams.

Society for Analytical Chemistry—London; The Feathers, Tudor Street, off Bouverie Street EC4. 6.30 p.m. Discussion, 'Advantages of spectrophotometric titrations' opened by R. A. Chalmers.

Society for Applied Bacteriology—London; Royal Society of Medicine, 1 Wimpole Street W1. 10 a.m. Business meeting. 2.15 p.m. (in conjunction with Society of Chemical Industry) 'New techniques in microscopy'.

THURSDAY 9 JANUARY

CS, RIC & SCI—Edinburgh; Lecture Room of the Royal Society of Edinburgh. 7.30 p.m. 'The pattern of research in the electrical industry' by H. K. Cameron.

FRIDAY 10 JANUARY

Oil & Colour Chemists' Association & Society of Dyers and Colourists—London; Burlington House, Piccadilly W1. 6 p.m. 'Colour measurement' Professor W. D. Wright.

SATURDAY 11 JANUARY

Society for Analytical Chemistry—Bristol; College of Technology. 12 noon. Annual general meeting followed by ordinary meeting on 'Technical books'.

TRADE NOTES

Price's (Bromborough) Ltd. have appointed Axel H. Agren A B, Gothenburg 2, as the selling agents in Sweden for Price's oleines, stearines, fatty acids, and fatty alcohols.

Axel H. Agren have been trading since 1887 and are well known in the iron, steel, rubber, plastics, and general chemical fields. They have a branch office at Stockholm and warehouses at Gothenburg, Stockholm, Malmo and Norrkoping.

Pulverizing Machinery

Offices of Pulverizing Machinery Ltd., the new company formed to market Mikro-D equipment, will be Parnall Road, Fishponds, Bristol, and technical sales office will be 1 Dover Street, Piccadilly, London W1. Telephone: Hyde Park 9528.

Activated Carbon

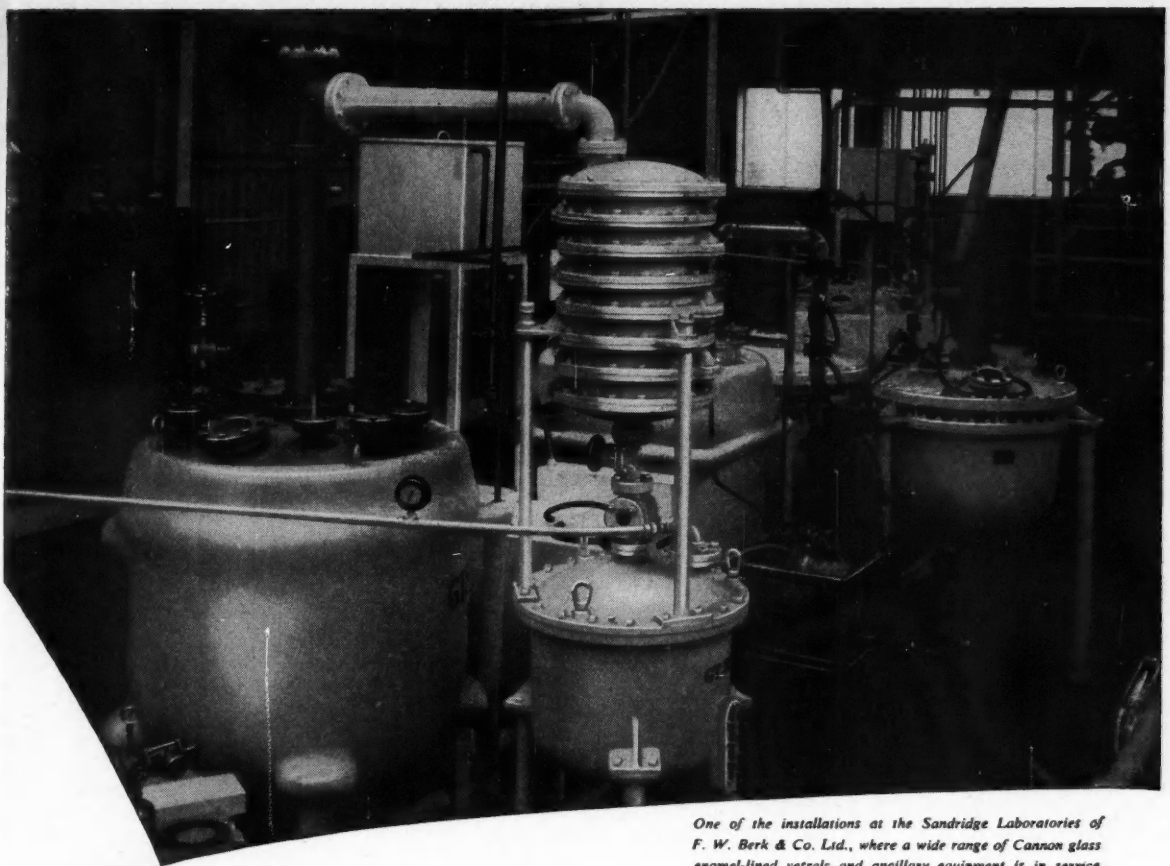
Two new grades of activated carbon have been added to the range of products of United Norit Sales Corp., Ltd., Amsterdam. The first, Norit Ultra, is a high grade, neutral carbon which has been developed to decolourise pharmaceutical products, especially where a water-white end colour is required.

Norit SX Low Iron is also designed for the chemical and pharmaceutical industry for use in cases where dissolved iron in activated carbon can cause difficulties.

United Norit are represented in the UK by Haller and Phillips Ltd., Wool Exchange, London EC2.

Alkaline Solutions

British Drug Houses of Poole, Dorset, are now bottling alkaline volumetric solutions in polythene containers. These solutions have been found to form deposits of silica and gradually to gain strength in glass. BDH will issue alkaline volumetric solutions in free and non-returnable one-litre packages, and in 4½-litre bottles charged at 27s 6d each, labelled with the customer's name and returnable for refilling.



One of the installations at the Sandridge Laboratories of F. W. Berk & Co. Ltd., where a wide range of Cannon glass enamel-lined vessels and ancillary equipment is in service

acid resisting

Cannon glass lined

CHEMICAL PLANT

Behind each piece of Glass Enamel Lined Cannon equipment there is a century's experience in Iron Founding and Vitreous Enamelling, while up-to-date design and modern production methods ensure rapid delivery of Chemical Plant that will satisfy the most exacting demands of the Industry.

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NEW PATENTS

By permission of the Controller, HM Stationery Office, the following extracts are reproduced from the 'Official Journal (Patents)', which is available from the Patent Office (Sale Branch), 25 Southampton Buildings, Chancery Lane, London WC2, price 3s 3d including postage; annual subscription £8.

Specifications filed in connection with the acceptances in the following list will be open to public inspection on the dates shown. Opposition to the grant of a patent on any of the applications listed may be lodged by filing patents form 12 at any time within the prescribed period.

AMENDED SPECIFICATIONS

On sale 5 February or as soon as possible thereafter

Therapeutically useful diamines. May & Baker. **761 888**

ACCEPTANCES

Open to public inspection on 12 February

Means and methods of treating water. UK Atomic Energy Authority. **790 474**

Production of ceramic bodies. Imperial Chemical Industries Ltd. [Cognate application 185.] **790 621**

Control devices for fluid-pressure systems. Power Jets (Research & Development) Ltd. **790 623**

Reaction products of polymers with polyisocyanates or polyisothiocyanates. [Cognate application 12879.] **790 543**

Catalytic reforming. Socony Mobil Oil Co., Inc. **790 476**

Process of making oil-in-water polyester resin emulsion pigment printing colour concentrates. Aver, L. **790 477**

Manufacture of organic aluminium compounds. Farbwerke Hoechst AG. **790 624**

Preparation of polyvalent metal basic salts of organic acids in hydrocarbon oil solution. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. **790 471**

Detecting the presence of halogens in water. Central Electricity Authority. **790 419**

Apparatus for drying flat or loose material required to be dried or for the heat treatment thereof. Kögler, J. **790 627**

Wet ground slag and cement products made therewith. Mitchell, F. G., and Rule, T. E. **790 628**

Manufacture of polymeric materials. Imperial Chemical Industries Ltd. **790 420**

Manufacture of 17-hydroxy-20-ketosteroids. Farbwerke Hoechst AG. [Addition to 739 139.] **790 421**

Dyeing plastic sheeting. Pittsburgh Plate Glass Co. **790 484**

Curing of glycidyl ethers and the resulting cured products. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. **790 634**

Exfoliated vermiculite. Clipson, S. **790 636**

Detergent powders. Unilever Ltd. **790 425**

Lubricating oil compositions. Shell Research Ltd. **790 472**

Plastics tap or valve, particularly for glass burettes. Townson & Mercer Ltd., and Brock, R. B. **790 426**

Process for manufacturing a supported platinum catalyst and a precursor therefor. Grace & Co., W. R. **790 431**

Water dispersible solid nitrilo-methylolphosphorus polymers. Albright & Wilson Ltd. **790 641**

Process for the fixation of creases and pleats in wool-containing fabrics. Bombrini Parodi-Delfino Soc. per Azioni. **790 491**

Shampoo leaves and a method of producing same. Safodik (Great Britain) Ltd. [Cognate application 28451.] **790 492**

Regenerating platinum catalyst in a reforming process. Esso Research & Engineering Co. **790 493**

Preparation of highly basic alkaline earth metal salts of organic acids. Shell Research Ltd. **790 473**

Phenolic oxo-aldehyde resins. Esso Research & Engineering Co. **790 644**

Bismaleamic acid. Whiffen & Sons Ltd. **790 646**

Piperazine derivatives. Ward Blenkinsop & Co. Ltd. **790 557**

Tower assembly for purifying liquids. Esso Research & Engineering Co. **790 436**

Apparatus for producing an endless filter rod. Muller, P. A. **790 694**

Synthetic resin-silica compositions. Cabot, Inc., G. L. **790 558**

Manufacture of maleic acid and/or maleic anhydride. Consortium für Elektrochemische Industrie Ges. **790 559**

Manufacture of polymeric quaternary ammonium compounds. Imperial Chemical Industries Ltd. **790 563**

Fractionation of phenolic and naphthalenic oils. Gaz de France, Service National. **790 564**

Greases. Esso Research & Engineering Co. **790 500**

Production of ω-amino acids. British Celanese Ltd. **790 503**

Production of oxide cathode filaments. Egyesült Izzolampa es Villamossagi R.T. **790 439**

Lubricating oil additives. Esso Research & Engineering Co. **790 504**

Fibre-forming polyesters. Esso Research & Engineering Co. **790 505**

Process for the manufacture of unsaturated aldehydes. Hoffmann-La Roche & Co. AG. F. **790 611** **790 612** **790 613**

Method and apparatus for filling bottles and like containers with liquid. Meyer Liquid Ltd. **790 506**

Process for removing nitrogenous compounds from hydrocarbon oils. Shell Research Ltd. **790 658**

Aryl polysulphides and their production and cutting oils containing same. Standard Oil Co. **790 568**

Recovery of ammonia from gases. Simon-Carves Ltd. **790 510**

Antiseptic preparations. Johnston, S. **790 605**

Compositions for flame-proofing cellulose containing material, their use, and material treated therewith. Geigy AG, J. R. **790 663**

Inhibition of vibration in flowing gas. Smith & Sons (England) Ltd., S. **790 519**

Antibiotics. Bristol Laboratories, Inc. **790 521**

Liquid metering mechanism. Arnau, A. **790 522**

Process for xanthating alkali cellulose. Spennfaser AG. **790 712**

Preparation of 9β11β-oxide steroid compounds. Merck & Co., Inc. **790 446**

Carotenoid compounds and the manufacture of same. Hoffmann-La Roche & Co., AG, F. **790 614**

Cellular plastics materials formed by reacting polyurethane products with water. Du Pont de Nemours & Co., E. I. **790 527**

Producing an isomerisation product of vitamin D or an ester thereof. Naamlooze Vennootschap Philips' Gloeilampenfabrieken. **790 443**

Thermostatic control devices for controlling the flow of fluid. Robertshaw-Fulton Controls Co. **790 724**

Gas blasting nozzles. Carborundum Co. **790 449**

Process for the production of sodium substitution products of cyclopentadiene and its alkylated and benzylated derivatives. Ziegler, K. [Addition to 763 825.] **790 450**

Production of cyclic hydroxamic acids of the pyridine series. Sadolin & Holmblad Aktieselskab. **790 584**

Manufacture of fibres, particularly glass fibres. Soc. Anon des Manufactures des Glaces et Produits Chimiques de St.-Gobain, Chauny & Cirey. **790 727**

Differential pressure responsive devices. Reese, W. M. **790 531**

Acrylyl dicyandiamides and polymers thereof. Rohm & Haas Co. **790 585**

Stable dimethylhaloformylcyclopentanones. Rohm & Haas Co. **790 451**

Steroids and the preparation thereof. Upjohn Co. **790 452**

Filtering apparatus. Essig, G. **790 533**

Production of dyestuffs of the anthraquinone series. Badische Anilin- & Soda-Fabrik AG. **790 728**

Process of making recrystallised silicon carbide articles. Norton Grinding Wheel Co. Ltd. (Norton Co.). **790 672**

Aryl substituted pantanoic acid ester and method of making same. Johnson & Son, Inc., S. C. **790 586**

Production of 1-aminobenzophenonesulphone-2-aldehydes or -ketones. Badische Anilin- & Soda-Fabrik AG. **790 587**

Preparation of fine ores, superfine ores, and dusts for sintering. Klöckner-Hüttenwerk Haspe AG. **790 738**

Preparation of sodium chloride. Naamlooze Vennootschap Koninklijke Nederlandsche Zoutindustrie. **790 457**

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